United States Department of the Interior
FISH AND WILDLIFE SERVICE
UTAH FIELD OFFICE
2369 WEST ORTON CIRCLE, SUITE 50
WEST VALLEY CITY, UTAH 84119

October 27, 2008

In Reply Refer To
FWS/R6
ES/UT
07-F-0005
6-UT-08-F-026

Memorandum

To: Field Office Manager, Bureau of Land Management, Price Field Office, 125 South 600 West, Price, UT 84501

From: Utah Field Supervisor, U.S. Fish and Wildlife Service, Ecological Services, West Valley City, Utah

Subject: Biological Opinion for BLM Resource Management Plan (RMP), Price Field Office (PFO)

This document transmits the Fish and Wildlife Service's (USFWS) Biological Opinion based on our review of potential activities described under the Resource Management Plan of the Utah Bureau of Land Management (BLM) Price Field Office's (PFO) and their potential effects on the federally threatened Mexican spotted owl (*Strix occidentalis lucida*), Last Chance townsendia (*Townsendia aprica*), Winkler pincushion cactus (*Pediocactus winkleri*), Maguire daisy (*Erigeron maguirei*), Jones cycladenia (*Cycladenia humilis* var. *jonesii*), Uinta Basin hookless cactus (*Sclerocactus glaucus*) and the federally endangered southwestern willow flycatcher (*Empidonax traillii extimus*), bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), razorback sucker (*Xyrauchen texanus*), Barneby reed-mustard (*Schoenocrabe barnebyi*), Wright fishhook cactus (*Sclerocactus wrightiae*), and San Rafael cactus (*Pediocactus despainii*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). In addition, this document includes the Conference Opinion for the candidate species yellow-billed cuckoo (*Coccyzus americanus occidentalis).* Critical habitat was designated for the Mexican spotted owl on February 01, 2001 and was re-designated August 31, 2004 (66 FR 8530, 69 FR 53181). Critical habitat was designated for the southwestern willow flycatcher on October 12, 2004 (69 FR 60705). Your July 21, 2008 request for formal consultation for all aforementioned species was received on July 23, 2008.

Price FO BLM Resource Management Plan proposed activities are categorized into the following 15 programs:

Air Quality
Cultural Resources
Paleontological Resources
Fire and Fuels Management
Forestry and Woodland Management
Hazardous Materials Management
Lands and Realty Management
Recreation Management
Riparian, Soils and Water Management
Special Status Species Management
Special Management Areas
Vegetation Resources
Visual Resources
Wild Horse and Burro Management
Transportation and Access Management

This Biological Opinion and Conference Opinion is based on information provided in the July 21, 2008 Biological Assessment, personal communications between the USFWS's biologists and the BLM's biologists, telephone conversations, email correspondence, conference calls, planning meetings, and other sources of information. A complete administrative record of this consultation is on file at this office.

Consultation History

This section summarizes significant steps in the consultation process. Additional correspondence, and email transmissions, that occurred between February 12, 2008, and September 25, 2008 are documented in the administrative record for this consultation.

- January 29, 2008: BLM electronically sent a draft Biological Assessment for the Price BLM Field Office Resource Management Plan to the USFWS for review;
- February 2008 through April 11, 2008: The USFWS reviewed and provided comments on the draft Biological Assessments;
- July 23, 2008: We received the final version of the PFO Biological Assessment and began formal consultation.

PROGRAMMATIC BIOLOGICAL OPINION

TABLE OF CONTENTS

DESCRIPTION OF THE PROPOSED ACTION 5

DESCRIPTION OF ACTIVITIES AND MANAGEMENT PRESCRIPTIONS UNDER THE PRICE RMP 9
Air Quality 9
Cultural Resources 9
Paleontological Resources 10
Fire and Fuels Management 11
Forestry and Woodland Management 11
Geology and Minerals Management 12
Hazardous Materials Management 14
Lands and Realty Management 14
Livestock Grazing Management 15
Recreation Management 15
Riparian, Soils and Water Resources 16
Special Status Species Management 16
Special Management Areas Programs 17
Vegetation Management 18
Visual Resource Management 18
Wild Horse and Burro Management 18
Fish and Wildlife Resource Management 19
Transportation and Access Management 19
CONSERVATION MEASURES 20

SPECIES ACCOUNTS, EFFECTS, AND CONCLUSIONS 20

MEXICAN SPOTTED OWL (*STRIX OCCIDENTALIS LUCIDA*) 20
SOUTHWESTERN WILLOW FLYCATCHER (*EMPIDONAX TRAILLII EXTIMUS*) 33
LAST CHANCE TOWNSENDIA (*TOWNSENDIA APRICA*) 45
WRIGHT FISHHOOK CACTUS (*SCLEROCACTUS WRIGHTIAE*) 53
SAN RAFAEL CACTUS (*PEDIOCACTUS DESPAINII*) 63
WINKLER CACTUS (*PEDIOCACTUS WINKLERI*) 71
UINTA BASIN HOOKLESS CACTUS *(SCLEROCACTUS GLAUCUS)* 80
BARNEBY REED-MUSTARD (*SCHOENOCRAMBE BARNEBYI*) 90
JONES CYCLADENIA (*CYCLADENIA HUMILIS*) 98
MAGUIRE DAISY (*ERIGERON MAGUIREI*) 106
COLORADO RIVER FISH 115
BONYTAIL (*GILA ELEGANS*) 115
COLORADO PIKEMINNOW (*PTYCHOCHEILUS LUCIUS*) 118
HUMPBACK CHUB *(GILA CYPHA)* 123
RAZORBACK SUCKER (*XYRAUCHEN TEXANUS*) 127
WESTERN YELLOW-BILLED CUCKOO *(COCCYZUS AMERICANUS)* 139

INCIDENTAL TAKE STATEMENT 149

REASONABLE AND PRUDENT MEASURES / TERMS AND CONDITIONS 150
RECOMMENDED CONSERVATION MEASURES 150
RE-INITIATION STATEMENT 156
LITERATURE CITED 157
APPENDIX A – BLM COMMITTED CONSERVATION MEASURES AND LEASE NOTICES 190

LIST OF TABLES

Table 1. Federally Protected Utah Species on BLM Lands Analyzed in this Biological Opinion (BO) for the Proposed Resource Management Plan by Price BLM Field Office 7
Table 2. Survey results for Last Chance townsendia populations on BLM lands 1991-2007 46

DESCRIPTION OF THE PROPOSED ACTION

The proposed action examined in this consultation is the continuation of land management activities described by the Resource Management Plan (RMP). The Price RMP/EIS replaces two Land Use Plans that provided management direction for the planning area: the 1983 Price River Management Framework Plan and the 1991 San Rafael Resource Management Plan. The Price RMP and the accompanying Environmental Impact Statement (EIS) will provide planning guidance for public lands managed by the Price Field Office (PFO) in Carbon and Emery counties in central-eastern Utah for the next 15 to 20 years. RMPs are used by the BLM to guide and control future actions and set standards upon which future decisions on site-specific activities will be based. RMPs only establish general management policy on a broad scale. They are not used to make decisions that commit resources on a small scale such as on specific parcels of land. RMPs identify desired outcomes, also known as "desired future conditions". These desired future conditions are expressed in RMPs as goals, standards, objectives, and allowable uses and actions needed to achieve desired outcomes. These are often referred to as RMP decisions or resource allocations. It is upon these RMP decisions or resource allocations that the effects determinations in this Biological Opinion are based for:

- Mexican spotted owl (*Strix occidentalis lucida*)
- Southwestern willow flycatcher (*Empidonax traillii extimus*)
- Uinta Basin hookless cactus (*Sclerocactus glaucus*)
- Maguire daisy (*Erigeron maguirei*)
- Barneby reed-mustard (*Schoenocrabe barnebyi*)
- Jones cycladenia (*Cycladenia humilis var. jonesii*)
- San Rafael cactus (*Pediocactus despainii*)
- Winkler cactus (*Pediocactus winkleri*)
- Wright fishhook cactus (*Sclerocactus wrightiae*)
- Last Chance townsendia (*Townsendia aprica*)
- Bonytail (*Gila elegans*)
- Colorado pikeminnow (*Ptychocheilus lucius*)
- Humpback chub (*Gila cypha*)
- Razorback sucker (*Xyrauchen texanus*)

In addition, our Conference Opinion considers the effects for the candidate species:

- Yellow-billed Cuckoo *(Coccyzus americanus occidentalis)*

The action area is defined at 50 CFR 402 to mean "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." Federal lands administered by other agencies and State, Tribal, and private lands that adjoin BLM-administered land are also considered part of the action area. In general, these are lands immediately adjacent to, downslope from, downstream of, or downwind from BLM-administered land where effects to the watershed, post-fire floods, ash flows, and elevated sedimentation may occur. The planning area is located in south-central Utah and includes all of Carbon and Emery counties. This area totals approximately 3.7 million acres. Of this, the BLM

manages 2.4 million acres surface and subsurface mineral estate, additional Federal mineral resources underlying the national forests and split-estate lands where the mineral estate is held by the Federal government but the surface right belongs to the state or private parties. State lands, privately owned lands, Manti-La Sal National Forest, the Uintah and Ouray Indian Reservations are all located in or adjacent to the Price Field Office, therefore, federally listed species and habitat located on these lands could be indirectly effected by resource management decisions made in the Proposed Action area.

The Price RMP describes activities in a number of resource management programs. Several of the aforementioned programs have "no effect" or "not likely to adversely affect" determinations on the following species, however overall, the entire Price RMP is a "likely to adversely affect" determination for the listed species: Mexican spotted owl, southwestern willow flycatcher, Uinta Basin hookless cactus, Maguire daisy, Barneby reed-mustard, Last Chance townsendia, Winkler pincushion cactus, Jones cycladenia, Wright fishhook cactus, San Rafael cactus, bonytail, Colorado pikeminnow, humpback chub and razorback sucker. The Price RMP is not likely to contribute to listing of the candidate species Western Yellow-billed cuckoo.

Table 1. Federally Protected Utah Species on BLM Lands Analyzed in this Biological Opinion (BO) for the Proposed Resource Management Plan by Price BLM Field Office. "Likely to adversely affect" determinations (LAA) are used if a program may have any direct or indirect adverse effect to a threatened or endangered species. "May affect, not likely to adversely affect" (NLAA) determinations conclude that activities occurring under the program are either insignificant or beneficial. "No effect" (NE) determinations conclude that the species and critical habitat will be unaffected by the proposed activities under the program. "Not likely to contribute to Federal listing" (NCFL) are listed for candidate species if the program was determined not to contribute to its listing as a threatened or endangered species. "No Jeopardy" (NJ) are listed if the program was determined not to jeopardize an experimental, non-essential population.

Price BLM Field Office																		
Programs Common Name (*Scientific Name*)	Air Quality	Cultural Resources	Paleontological Resources	Fire and Fuels	Forestry and Woodlands	Geology and Minerals	Hazardous Materials	Lands and Really	Livestock Grazing	Recreation	Riparian, soils and water	Special Status Species	Special Management Areas	Vegetation	Visual	Wild Horse and Burrow	Fish and Wildlife	Transportation and Access
Wright fishhook Cactus (*Sclerocactus wrightiae*)	NE	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	LAA	LAA	LAA
Barneby reed-mustard (*Schoenocrabe Barnebyi*)	NE	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	LAA	LAA	LAA
Last Chance townsendia (*Townsendia aprica*)	NE	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	LAA	LAA	LAA
San Rafael cactus (*Pediocactus despainii*)	NE	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	LAA	LAA	LAA
Winkler pincushion cactus (*Pediocactus winkleri*)	NE	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	LAA	LAA	LAA
Jones cycladenia (*Cycladenia humilis* var. *jonesii*)	NE	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	LAA	LAA	LAA
Uinta Basin hookless cactus (*Sclerocactus glaucus*)	NE	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	NLAA	LAA	LAA

Programs Common Name (Scientific Name)	Air Quality	Cultural Resources	Paleontological Resources	Fire and Fuels	Forestry and Woodlands	Geology and Minerals	Hazardous Materials	Lands and Really	Livestock Grazing	Recreation	Riparian, soils and water	Special Status Species	Special Management Areas	Vegetation	Visual	Wild Horse and Burrow	Fish and Wildlife	Transportation and Access
Maguire daisy ***(Erigeron maguirei)***	NE	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	LAA	LAA	LAA
Mexican spotted owl ***(Strix occidentalis lucida)***	NE	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	LAA	LAA	LAA
Southwestern willow Flycatcher ***(Empidonax traillii extimus)***	NE	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	NLAA	LAA	LAA
Colorado River Fishes	NE	LAA	LAA	LAA	NLAA	LAA	LAA	LAA	LAA	LAA	LAA	NLAA	NLAA	LAA	NLAA	NLAA	LAA	LAA
Yellow-billed Cuckoo *(Coccyzus americanus occidentalis)*	NCFL	NCFL	NCFL	NCFL	NCFL	NCFL	NCFL	NLAA	NCFL	NCFL	NCFL	NCFL	NCFL	NCFL	NCFL	NCFL	NCFL	NCFL

Description of Activities and Management Prescriptions under the Price RMP

Air Quality

The primary objective of air quality management within the Price planning area is to maintain air quality in accordance with standards precribed by federal and state laws and regulations. The air quality program does not consider potential impacts to fish and wildlife resources beyond the standards set forth by EPA and the Utah Department of Environmental Quality. Air quality management practices include recommendations for dust control measures, smoke management, weather monitoring, air quality data gathering, regulatory conformity analyses, and BLM review of New Source Reviews and Prevention of Significant Deterioration (PSD) Permits. Air quality management may include recommendations for the best available control practices or restrict surface development in order to meet state and national ambient air quality standards. BLM-initiated actions or authorizations are planned in accordance with state and national air quality standards through coordination with the Division of Air Quality (UDAQ), Utah Department of Environmental Quality (UDEQ), and the U.S. Environmental Protection Agency (EPA). Laws controlling air pollutants in the United States include the Clean Air Act of 1970 and its amendments, and the 1999 Regional Haze Regulations. The concentrations of air contaminants in the BLM's planning areas need to be within limits of all state ambient air quality standards, and national ambient air quality standards (NAAQS).

The air quality in the Price Field Office is good. Based on measured data, the regions remoteness, and a lack of major urban communities, the region around Price is designated as an attainment area for all criteria pollutants. Data from the most recent Utah Division of Air Quality Report (UDAQ 2004) indicate that Power Plants are the major source of air pollution in Carbon and Emery Counties. The primary sources of pollutants in these counties occur outside or adjacent to BLM managed lands.

Cultural Resources

The objective of the cultural resource management program is to protect, preserve, interpret, and manage significant cultural resources for their informational, educational, recreational, and scientific values. Site-specific inventories for cultural resources are required before the start of surface disturbance or if Price Field Office-administered lands were proposed for transfer out of federal ownership.

Inventories have traditionally been conducted to support site-specific surface-disturbing projects, such as mineral and energy development, to comply with the requirements of Section 106 of the National Historic Preservation Act and other cultural resource preservation laws. During these activities, cultural resources are inventoried, categorized, and preserved; in addition staff will conduct field activities, perform excavations; map and collect surface materials, research records, and photograph sites and cultural resources. Inventory data collection is used for documentation and development of mitigation plans before other resource program surface disturbance. Inventory activities commonly entail the use of hand tools, power tools, or heavy machinery. Survey intensity varies among inventories and may last from one day to several weeks. In addition, academic institutions have performed research excavations, although such scientific investigations were limited. Less than 5 percent of the PFO has been inventoried for cultural

resources. Through this inventory, more than 2,000 sites have been identified. Given the current number of acres inventoried and the current number of sites, archeologists estimate that thousands more sites may exist throughout the PFO. The PFO is considered to be the center of the Fremont culture, and its abundant cultural resources show human presence in the area during the past 12,000 years.

Cultural resource land management may further include: reduction of imminent threats and potential conflicts from natural and human-caused deterioration, including other resource uses; creation of opportunities for scientific and educational uses of cultural resource sites; interpretation and education focused on previous human occupation and land uses, provision of traditional Native American uses though permits, including collection of herbs, medicines, traditional use items, and items necessary for traditional, religious, or ceremonial purposes. These actions may involve proactive research, protection and inventories involving universities, service groups, site stewards, tribes and community outreach.

Surface disturbance is generally avoided near significant cultural resource sites and within ¼ mile or the visual horizon of significant segments of historic trails and canals. Sites listed on, or eligible for, the National Register for Historic Places are protected and would be managed for their local and national significance in compliance with the National Historic Preservation Act, the Archaeological Resources Protection Act, the American Indians Religious Freedom Act, and the Native American Graves Protection and Repatriation Act, as appropriate. Seven sites within the PFO are listed on the NRHP. Current laws protect sites that are listed on the NRHP and those that are eligible. Those sites currently listed on the NRHP are as follows: Flat Canyon Archeological District, Desolation Canyon National Historic Landmark, Black Dragon Canyon Pictographs, Buckhorn Wash Rock Art Sites, San Rafael Bridge, Denver and Rio Grande Lime Kiln (also known as Buckhorn Flat Lime Kiln), Rochester-Muddy Creek Petroglyph Site.

Paleontological Resources

The objective of the paleontological resource management program is to protect, preserve, interpret, inventory and manage significant paleontological resources for their informational, educational, recreational, and scientific values. On the ground paleontological inventories are required prior to surface disturbing areas in Class I areas.

During these activities, paleontological resources are inventoried, categorized, and preserved; in addition staff will conduct field activities, perform excavations; map and collect surface materials, research records, and photograph sites and resources. Inventory data collection is used for documentation and development of mitigation plans before other resource program surface disturbance. Inventory activities commonly entail the use of hand tools, power tools, or heavy machinery. Survey intensity varies among inventories and may last from one day to several weeks. In addition, academic institutions have performed research excavations.

Paleontological resource land management may further include surface collection of common invertebrate and botanical paleontological resources for non-commercial use, interpretation of paleontological resources, protection of fossil resource sites not feasible or desirable to excavate.

Fire and Fuels Management

Objectives of fire management are to protect life, property, and resource values from wildfire and to restore the natural role of fire in the ecosystem. The major activities involved with the fire management program include: wildfire suppression, managing natural ignitions as wildland fire use for resource benefit, prescribed burning, non-fire fuels treatment for hazardous fuels reduction, and emergency stabilization and rehabilitation following wildfires.

Fires within the planning area are both naturally occuring and used as a management tool. Naturally occuring fires are widely distributed in terms of frequency and severity.

Wildfires are suppressed when they threaten values and resources, such as: wildland urban interface areas, developed recreation sites, areas that are unlikely to recover following fire (i.e., areas of noxious weeds or invasive species), sensitive soils, critical threatened and endangered species habitat, or fires with potential to spread to private, state, or other federal lands. Fire suppression methods vary with the intensity of the wildfire and are conducted on an emergency basis. Firelines may be constructed by hand or by heavy equipment to contain the wildfire. Water may be withdrawn from nearby sources to suppress fires. Chemical fire suppression agents and retardants may be used, if necessary. The use of aerial fire retardant is restricted near water resources. After a fire is extinguished, emergency stabilization and rehabilitation techniques, such as seeding and soil stabilization actions, may be used restore a burned or suppressed area to its previous vegetation cover. These suppression and post-suppression activities often employ the use of off-road vehicles, hand tools, and heavy equipment such as bulldozers.

Wildland fire use fires are implemented in areas that would benefit from the reintroduction of fire. Some suppression techniques, as described above, may be used to keep the fire within pre-determined boundaries, but no emergency stabilization and rehabilitation actions are taken following wildland fire use.

Prescribed fire and non-fire fuels treatment objectives are to restore natural fire regimes, reduce hazardous fuel loading, and enhance resources, such as wildlife habitat. Prescribed fires follow a pre-determined prescription and include activities such as broadcast burning or pile burning following manual or mechanical fuel treatments. Non-fire fuel treatment actions include: tree thinning or clear-cutting (i.e., juniper) by hand or using mechanized equipment, chemical application of herbicides to reduce shrub cover, disking to remove vegetation and prepare the soil for seeding, and seeding of native and/or non-native species to prevent increase of invasive species.

Forestry and Woodland Management

Forest management objectives are to maintain and enhance the health, productivity, sustainability, and biological diversity of forest and woodland ecosystems and to provide a balance of natural resource benefits and uses, including opportunities for commercial and non-commercial harvest of forest and woodland products on a sustainable basis. Forests are managed for multiple uses, such as recreation, livestock grazing, and wildlife habitat. The forestry and woodlands program also implements silviculture practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for

density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest.

Roughly 70,000 acres of forest and 650,000 acres of woodland (mostly pinyon-juniper) exist in the PFO. Current forest and woodland management is limited to permit sales for noncommercial harvest and occasional hazardous fuels reduction projects conducted by BLM fire management. Interest in commercial timber production is low. The highest demand for forest products is fuelwood and Christmas trees. There is also limited demand for juniper fence posts. An additional use of forest resources within the PFO is vegetative harvest for grass and seeds. Pinyon nuts and grass seeds are the vegetative products in highest demand and with the widest distribution in the PFO. Forest management actions may include conducting surveys, obtaining easements, pursuing legal access, allowing road development, and installing drain culverts and water bars. Private and state land may be accessed for forest management purposes through easement acquisitions. Non-timber forest products are harvested and sold by permit. Non-timber forest products include firewood, posts, poles, Christmas trees, nuts, seeds and wildings.

Geology and Minerals Management

Objectives of the Geology and Minerals program are to provide opportunities for mineral exploration, development and reclamation under leasing laws subject to legal requirements to protection other resources. Mineral development is subject to leasing, location, or sale based on the Federal mineral law covering that particular commodity. The planning area will be open to consideration for exploration, leasing, and development of leasable minerals including oil, gas, coal, oil shale, and geothermal. BLM minerals program is divided into the three categories of salable, leasable, or locatable minerals.

Salable Minerals

Salable minerals include sand, gravel, building stone, and humate. Before issuing contracts or free use permits for salable minerals, appropriate environmental analyses are conducted, including special studies or inventories of cultural resource values, threatened or endangered plant and wildlife species, and other resources. Stipulations or conditions may be included in the terms of the contract to ensure protection of the natural resources and reclamation of the land following project completion. Site reclamation is required following any surface-disturbing activity by mining for salable minerals. Reclamation includes removing surface debris, recontouring, reducing steep slopes, and planting vegetation. All reclamation proposals must conform to federal and state agency requirements.

Leasable Minerals

Leasable minerals include fluid (oil, gas, geothermal, coal bed natural gas) and solid minerals such as coal and sodium. In Utah, coal is generally extracted using underground mining methods although surface coal mine operations and methods are likely to be proposed for some future operations. Surface facilities include truck/train loadouts, offices, maintenance facilities, change house, electrical substations, and roads. Total surface disturbance is usually less than 20 acres.

Surface coal mining involves the use of draglines, shovels, and haul trucks and results in large areas of surface disturbance from road construction; topsoil and overburden removal; and stock

piling of these materials. Reclamation includes recontouring as closely to the original landscape as possible, reconstruction of drainages, reseeding, and monitoring.

Fluid leasable minerals include oil, gas, and geothermal steam. In areas where development of oil and gas resources would conflict with the protection or management of other resources or public land uses, mitigation measures are identified and may appear on the leases as either stipulations to uses, or as restrictions on surface occupancy. Once the parcel is sold, it matures into a lease and is authorized for a 10 year period. Currently oil and gas leasing in the Price FO contains 489,125 acres are open for oil and gas leasing and 673,389 acres for coal leasing.

Initial geophysical exploration involves use of vehicles to lay the geophones and drill the shot holes for charges, or "thumpers" to create the sound waves. Exploration for oil and coal bed natural gas may also include drilling more than one well. Surface disturbance during the exploration phase of drilling includes the construction of roads, well pads, reserve pits, and other facilities.

Development of oil and gas fields includes construction pads, storage tanks, storage tank batteries, oil and gas processing facilities and necessary pipeline, compressor engines and power lines right-of-ways. Generally, each drill site includes a 3 acre pad, 1 mile of road, and 1 mile of pipeline. Directional drilling requires a larger pad size and is dependent on the number of wells drilled from each pad.

Methods to dispose of residual water from oil and gas production include: subsurface re-injection, direct surface discharge, and discharge into a containment pond or pit. Chemically polluted water may be treated before surface discharge or may be reinjected. Geothermal resources are available for exploration, development, and production and are subject to the same surface disturbance restrictions and other stipulations applied to oil and gas exploration, development, and production.

Potential impacts of leasable mineral developments include increased soil erosion resulting in increased sedimentation, some potential for release or exposure to toxic chemicals and wastes, individual mortality, localized population mortality, habitat loss/fragmentation, and reduction of reproductive success.

Locatable Minerals

Locatable minerals in the project area include uranium, gypsum and clay. Minerals that are normally locatable may be leasable on acquired lands. There are 32,000 acres open for mining these materials in the planning area.

Surface disturbance for uranium extraction includes processing plants, evaporation ponds, equipment maintenance buildings and offices, or other various extraction support facilities disturbing approximately 5-15 acres. Potential impacts of locatable mineral developments include increased soil erosion resulting in increased sedimentation, some potential for release or exposure to toxic chemicals and wastes, individual mortality, localized population mortality, habitat loss/fragmentation, and reduction of reproductive success.

Potential impacts of locatable mineral developments include increased soil erosion resulting in increased sedimentation, some potential for release or exposure to toxic chemicals and wastes, individual mortality, localized population mortality, habitat loss/fragmentation, and reduction of reproductive success.

Hazardous Materials Management

The primary objective of hazardous materials management is to ensure that human hazardous materials concerns, such as hazardous materials, wastes, abandoned mine & well sites are mitigated or eliminated. The potential for intentional or accidental releases of hazardous materials onto public lands will also be minimized to protect public and environmental hazardous materials on lands administered by BLM.

State Office and field office contingency plans specify how personnel are supposed to respond to a hazardous substance incident, such as hazard recognition, retreating procedures, record keeping, and reporting. Contingency plans recommend using signs, fencing, and/or barricades for site security, unless such actions would create an attractive nuisance. Emergency spill response may necessitate containment measures such as building dikes, or overland vehicle and equipment travel.

Management of hazardous materials, substances, and waste (including storage, transportation and access, and spills) will be conducted in compliance with 29 CFR 1910, 49 CFR 100-185, 40 CFR 100-400, Comprehensive Environmental Response Compensation and Liability Act, Resource Conservation and Recovery Act, Superfund Amendment Reauthorization Act, Toxic Substances Control Act, Clean Water Act, and other federal and state regulations and policies regarding hazardous materials management. Databases of previous mining operations exist for the decision area, but no formal inventories for abandoned mine lands have occurred. Because of previous mining operations throughout the decision area, there is a potential for physical safety hazards and/or environmental issues.

Lands and Realty Management

The objectives of the lands and realty management program are to support multiple-use management goals of other BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights-of-way access to serve administrative and public needs.

Public land tracts that are not critical to current management objectives will be disposed of through the realty management program (reviewed on a case-by-case basis). Non-federal lands may be acquired through exchange in areas with potential for recreation development or in areas containing important wildlife, cultural, scenic, natural, open space, or other resource values. Protective withdrawals may be established to protect and preserve important resource values, but require extensive mineral investigations.

Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights-of-way. Rights-of-way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights-of-way may be temporary or extend up to 30 years, or in perpetuity.

The program pursues cooperative agreements, develops recreation site facilities, considers offsite mitigation, minimizes access in wildlife habitat, fences revegetation sites, blocks linear rights-of-way to vehicle use, considers temporary-use permits, considers new withdrawals, and identifies parcels for landfills under the Recreation & Public Purposes Act. Areas with important resource values will be avoided where possible when planning routes and installation of new facilities. Effects will be mitigated if it becomes necessary to place facilities within avoidance areas.

Livestock Grazing Management

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base, while improving wildlife habitat and watershed condition and meeting Utah's Rangeland Health Standards.

Not all BLM lands are open to livestock grazing due to conflicts with other resource uses. Range management activities may include vegetation treatments such as prescribed fire or mechanical and chemical control of noxious weeds, sagebrush, and other target species. Salt or mineral supplements may be approved to help manage livestock distribution. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire and Fuels Management, or vegetative treatments – see Vegetation Management).

Within the planning area all grazing areas are open for livestock grazing, with the exception of Gray Canyon Wildland Area, Gordon Creek Wildlife Area, and Wildlife Allotment, which is closed to grazing because of its aesthetic and recreation values. Livestock grazing on public land is administered through Livestock Grazing Allotments. Grazing permits are usually issued for a 10-year period. Livestock grazing management includes using an interdisciplinary allotment evaluation to provide specific guidance and actions, allocation of long-term increases or decreases in forage on a case-by-case basis, analyzed through the NEPA process, use of livestock grazing to enhance ecosystem health and help accomplish resource objectives. Other range improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities. These projects are designed and constructed to implement grazing systems that are designed to meet Rangeland Health Standards and improve watersheds conditions, wildlife habitat, riparian proper functioning conditions, and forage production.

Recreation Management

The objective of recreation resources management is to identify recreation values and resources on public lands and make decisions which will ensure that these values are maintained on a long-term sustained yield basis to meet the recreational needs of the using public. Recreation management includes allowing recreational access by the public, developing and maintaining recreation areas and facilities, issuing special recreation permits for organized groups, competitive events and commercial outfitters and guides, acquiring recreational access, providing information to the public about recreation resources and assessing effects of recreational use to the environment. The BLM monitors recreational use, develops management plans, and evaluates recreational potential.

Through the Resource Management Planning process BLM identifies and designates special recreation management areas. These include areas which require greater recreation investment, where more intensive recreation management is needed and recreation is a principal management objective. Recreational activities in the project area may include OHV use, camping, hiking, rappelling, photography, wildlife & scenery viewing, horseback riding, hunting, and mountain biking.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Under this program, management actions include implementation of BMPs for reduction of soil loss by performing appropriate land treatments such as seeding and fuels reduction, reclamation of surface disturbance and temporary roads associated with other projects, apply seasonal closures, monitoring public drinking water, and completing groundwater studies. Other soil resource projects may include abandoned mine reclamation, waste rock removal, tailings cleanup, soil sampling, and erosion studies. Water management practices chiefly strive to maintain or improve surface and ground water quality. Other riparian management activities include delineation of buffer zones, restriction to surface disturbance and restoration of hydrologic function.

Special Status Species Management

Objectives of the special status species program include maintenance of biological diversity of plant and animal (terrestrial and aquatic) species by supporting the State Division of Wildlife Resources' strategic plans for wildlife population objectives to the extent practical and consistent with BLM multiple-use management requirements. Other objectives include the development of protective measures for federally listed species and other special status species; cooperation with other agencies in managing listed species; facilitation of scientific research of special status species and their habitats; and to the extent possible, avoidance of habitat fragmentation.

In addition, BLM's special status species management program often includes the enforcement of timing restrictions, completion of surveys, and development of conservation measures and best management practices for the mitigation of effects of development deemed to be discretionary actions of the BLM. Activities implemented under this program may include identification and enforcement of timing stipulations; completion of species surveys; implementation of Recovery Plans; implementation of Conservation Agreement and Strategy decisions to increase populations and improve habitat of special status species; and closure of areas containing sensitive species populations or habitat.

Special Management Areas Programs

The following describes special management areas, including Areas of Critical Environmental Concern (ACEC); Wild and Scenic Rivers (WSR); and Wilderness Resources which include Wilderness Study Areas (WSAs), and non-WSA areas with wilderness characteristics.

Areas of Critical Environmental Concern (ACECs) - An ACEC is the principal BLM designation for public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards. Management actions include limitation of OHV use to designated routes, lease for oil and gas under NSO stipulations, no allocation of livestock grazing, and regular monitoring. There are 13 ACECs in the planning area for a total of 268,320 acres.

Wild and Scenic Rivers - Congress designates rivers into the National Wild and Scenic Rivers system. These can include scenic, wildlife, fish, cultural and recreational values. Eligible and suitable rivers are given a tentative classification of wild, scenic, or recreational based upon the amount of disturbance within the river corridor. Both congressionally designated rivers and eligible or suitable segments are managed to protect the free-flowing nature of the river, the tentative classification, and the outstandingly remarkable values. Currently no wild and scenic rivers have been designated within the decision area. As part of the wild and scenic river review process, fifteen river segments have been determined eligible for inclusion into the National Wild and Scenic Rivers System. With the implementation of the Proposed RMP, twelve eligible segments totaling 135 river miles will be managed as suitable for inclusion into the National Wild and Scenic Rivers System. Management actions include preventing modifications such as impoundments, diversions, channelization, and other actions that could alter the values of these areas.

Wilderness Resources - There are two types of special designations in this category: wilderness study areas, and non-WSA lands with wilderness characteristics. In general this means that there can be no new permanent structures or new disturbance that would require reclamation in order for the area to appear natural. The lands are closed to mineral leasing. With very few exceptions, there can be no new permanent structures or new disturbance, and no motorized or mechanized transport. The lands are closed to mineral leasing and mineral location under the mining laws. In the planning area, there are designated 11 designated wilderness study areas (WSAs) within what is now the PFO. These WSAs total 526,960 acres. A discussion of the current resource values and uses in each WSA, established in 1980 under the authority of Section 603(c) of FLPMA, can be found in the Utah BLM statewide Wilderness Final Environmental Impact Statement (BLM 1990). Management actions in WSA's include designating open routes for motorized uses if it will not impair the area's wilderness suitability, or in this case, the BLM would take appropriate steps including use of restrictions or closures, installation of additional signs and barricades, and restoration of affected areas. In addition, non-WSA areas that retain wilderness characteristics are often managed similarly to official WSA's.

Other Special Designations – This category includes byways and backway, National Historic Trails, and National Landmark. Portions of the Old Spanish National Historic Trail exist in the

PFO, running through the Green River. In addition the planning area contains the Cleveland Lloyd Dinosaur Quarry, and the Desolation Canyon National Historic Landmark

Vegetation Management

Objectives of the vegetation resource management program are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Primary goals of the vegetation management program are to monitor and improve riparian habitats, perform mitigation, support other programs and rehabilitate functioning at-risk and non-functioning areas.

Vegetation treatments, (e.g., timber harvest and sagebrush spraying, burning, chaining) will be designed to meet overall resource management objectives, which include the protection of listed plant and animal species. Control methods include chemical, biological, and mechanical, and cultural practices. Biological control can involve the use of weevils, beetles, or goats.

Mechanical methods include dozing, cutting, chopping, and pulling. Cultural controls include education and public awareness campaigns, use of weed free forage, and changes in grazing practices to increase health and vigor of plant communities so that they are more resistant to invasion. Depending on the site and circumstances, these methods can be used individually or in combination. Fire is used to improve range forage production, wildlife habitat, timber stands, sale debris disposal, and to reduce hazardous fuel buildup.

Visual Resource Management

The objective of visual resource management (VRM) is to manage public lands in a manner that will protect the quality of the scenic (visual) values of the landscape. To accomplish this objective, BLM establishes visual resource management priorities while giving consideration to other resource values and uses. Visual resources are managed in accordance with objective classes that have been assigned to all public lands in each Field Office.

To meet VRM objectives, the BLM designs facilities, such as power lines, oil and gas wells, wildlife guzzlers, and storage tanks to fit with their surroundings. Design considerations include location (e.g., screening or distance), color (painting), building materials, size and scale, and reclamation.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

There are four Herd Areas or Herd Management Areas located in the planning area: Range Creek, Sinbad, Muddy Creek, and Robbers' Roost. These areas total approximately 169,906 acres, 150,755 of which are on BLM land.

Management actions under this program include managing burros for age and sex ratios, genetic viability, allow burro research, and introduce burros from other populations. Management can sometimes involve herd gathering. Helicopters are used when gathering horses and burros by hazing the animals into ground traps, set-up using portable metal panels.

Fish and Wildlife Resource Management

The BLM works closely with the UDWR to manage habitat for fish and wildlife (including big game, upland game, waterfowl, neo-tropical migratory birds, small mammals, amphibians, and reptiles) to achieve and maintain suitable habitat for desired population levels and distribution within the decision area. The UDWR is responsible for managing wildlife population levels; the BLM is responsible for managing wildlife and fisheries habitat in a condition that will support desired levels of species. The BLM works cooperatively with the UDWR to maintain and reestablish populations of native species that have used the historic range located within the planning area through habitat management and restoration.

Objectives of the fish and wildlife resource management program include maintenance of habitat quantity, quality, and connectivity to sustain diverse wildlife populations; maintenance and improvement of aquatic habitats to sustain diverse fisheries and aquatic populations; and conservation of migratory bird habitat as directed by Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) and the Migratory Bird Treaty Act and emphasize management of migratory birds listed on the USFWS current list of Birds of Conservation Concern and the Partners-in-Flight priority species. Wildlife Management actions may include surveying; habitat monitoring; habitat and species inventories, habitat improvement, habitat restoration, water developments, riparian habitat improvements, etc., as well as development of habitat management plans.

The BLM develops stipulations and conservation measures to both protect and enhance wildlife and fisheries habitats. These stipulations and conservation measures may include such things as: recommending withdrawal of some areas from mineral entry; limiting access to specific areas by OHVs and pedestrians; and minimizing the impacts of surface development. The BLM may acquire crucial wildlife habitats or easements and conduct inventories of potential habitats for occurrences of threatened, endangered, and sensitive species or their habitat.

Transportation and Access Management

The objectives of the travel management program include maintenance of access for public and administrative needs; establishment of a route system that contributes to protection of sensitive resources; accommodates a variety of uses and minimizes user conflicts; and coordination of OHV management.

Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Conservation Measures

As part of the proposed action, in order to minimize the effects of the above management programs, the Price BLM Field Office has committed to a variety of species-specific conservation measures and, in conjunction with USFWS, developed species-specific lease notices for leases permitted under the Geology and Minerals Program. For a complete listing of the BLM committed conservation measures, lease notices, and Best Management Practices (BMPs), please refer to Appendix A.

SPECIES ACCOUNTS, EFFECTS, AND CONCLUSIONS

The following section includes species-specific information pertaining to the status and distribution of each species, the environmental baseline, and programmatic-level effects of the proposed action.

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed State or Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation process.

"Effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline. Direct effects encompass the immediate, often obvious effect of the proposed action on a species or its habitat. Indirect effects are caused by, or result from the proposed action, are later in time, and are reasonably certain to occur. In contrast to direct effects, indirect effects may be more subtle, and may affect species' populations and habitat quality over an extended period of time, long after RMP activities have been completed.

Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consultation. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Mexican spotted owl (*Strix occidentalis lucida*)

Status of the Species

Species / Critical Habitat Description

The Mexican spotted owl (*Strix occidentalis lucida*) is one of three subspecies of spotted owl recognized by the American Ornithologists' Union (AOU 1957:285). The other two subspecies are the northern (*S. o. caurina*) and the California spotted owl (*S. o. occidentalis*). The Mexican subspecies is geographically isolated from both the California and northern subspecies.

The spotted owl is mottled in appearance with irregular white and brown spots on its abdomen, back and head. Several thin white bands mark an otherwise brown tail. The spots of the Mexican spotted owl are larger and more numerous than in the other two subspecies, giving it a lighter appearance. *Strix occidentalis* translates as "owl of the west"; *lucida* means "light" or "bright." Unlike most owls, spotted owls have dark eyes.

Adult male and female spotted owls have similar plumage. However, the sexes can be identified by voice and size differentiation. Juveniles, subadults, and adults can be distinguished by plumage characteristics (Forsman 1981; Moen et al. 1991). Juvenile spotted owls (hatchling to approximately five months) have a downy appearance. Subadults (5 to 26 months) have pointed rectrices with white tips (Forsman 1981, Moen et al. 1991). Rectrices of adult (>27 months) feathers have rounded, mottled tips.

Although the spotted owl is often referred to as a medium-sized owl, it ranks among the largest owls in North America. Of the 19 species of owls that occur in North America, only 4 are larger than the spotted owl (Johnsgard 1988). As a species, the spotted owl averages 41-48 cm (16-19 inches) long (Earhart and Johnson 1970), 107-114 cm (42-45 inches) across the spread wings (Walker 1974), and weighs 547-647 grams (19.5-23 ounces). These measures are expressed as ranges because, similar to other owl species, spotted owls exhibit reversed sexual dimorphism (i.e., females are larger than males).

Life History and Population Dynamics

Spotted owls have one of the lowest clutch sizes among North American owls (Johnsgard 1988); females lay one to three eggs, two being the most common. Mexican spotted owls breed sporadically and do not nest every year (Ganey 1988). In good years, most of the population will nest, whereas in other years only a small proportion of pairs will nest successfully (Fletcher and Hollis 1994).

Courtship begins in March and eggs are laid in late March or, more typically, early April. Incubation begins shortly after the first egg is laid, and is performed entirely by the female. Female spotted owls generally incubate for approximately 30 days. During incubation, the female leaves the nest only to defecate, regurgitate pellets, or receive prey delivered by the male, who does most or all of the foraging. The eggs usually hatch in early May (Ganey 1988). Females brood their young almost constantly, leaving their nests for only brief periods during the night. Nestling owls fledge from four to five weeks after hatching, from early to mid-June in most cases (Ganey 1988). Owlets often leave the nest before they can fly, simply jumping from the nest onto surrounding tree branches or the ground. Within a week after leaving the nest, most owlets can make short, clumsy flights. Three weeks after leaving the nest owlets can hold and tear up prey on their own, and by late July most have become proficient at pouncing on crawling insects (Forsman et al. 1984). The young depend on their parents for food during the summer and will eventually disperse out of the natal area in the fall. Reproductive output varies both spatially and temporally (White et al. 1995), but may be higher than the California and the Northern spotted owl (Verner et al. 1992, Thomas et al. 1993).

Forsman et al. (1976) described spotted owls as "perch and pounce" predators. They typically locate prey from an elevated perch by sight or sound, then pounce on the prey and capture it with

their talons. Spotted owls have also been observed capturing flying prey such as birds and insects (Verner et al. 1992). Specific prey groups include: woodrats, mice, voles, rabbits, gophers, bats, birds, reptiles, and arthropods. Spotted owls dwelling in canyons of the Colorado Plateau take more woodrats, and fewer birds, than do spotted owls from other areas.

Mortality factors include predation, starvation, and accidents. Little is known about how disease and parasites contribute to mortality of spotted owls. Avian predators include great horned owls, northern goshawks, red-tailed hawks, and golden eagles. The extent of predation is unknown; however both juveniles and adults are preyed upon (Willey 1993). Starvation may result from low abundance or availability of prey. Most instances of starvation occurred from late fall through winter when prey resources were reduced in abundance and availability (Willey 1993, Block and Ganey, unpub. data). Starvation may also predispose individuals to increased predation. Little data is available on frequency of accidents, and subsequent mortality. Instances of spotted owls being hit by cars have been documented. Owls may also collide with power lines or other obstacles (USFWS 1995).

Based on limited study information, annual survival rates of adult Mexican spotted owls is 0.8-0.9 and juvenile survival is 0.06-0.29 (USFWS 1995). Survival estimates may be biased low, but conclude higher survival of adults than juveniles. Available data is either insufficient or has not been analyzed to estimate population trends.

Status and Distribution

The Mexican spotted owl (*Strix occidentalis lucida*) was listed as a threatened species on March 16, 1993 (58 FR 14248). The primary threats to the species were cited as even-aged timber harvest and catastrophic wildfire, although grazing, recreation, and other land uses were also mentioned as possible factors influencing the Mexican spotted owl population. The Fish and Wildlife Service appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (USFWS 1995).

On August 31, 2004, the USFWS designated approximately 8.6 million acres of critical habitat for the Mexican spotted owl in Arizona, Colorado, New Mexico, and Utah, on Federal lands (69 FR 53181). There are approximately 47,700 acres of designated critical habitat in the decision area on the western boundary adjacent to Zion National Park and southeast of the town of Tropic. However, not all of these acres contain the primary constituent characteristics essential to the conservation of the species. Some of the primary constituent elements for the Mexican spotted owl include: (1) cooler and often more humid conditions than the surrounding area, (2) clumps or stringers of trees and/or canyon walls with crevices, ledges or caves, (3) high percent of ground litter and woody debris, and (4) riparian or woody vegetation. The primary constituent elements related to forest structure include (1) a range of tree species, (2) a shade canopy created by the tree branches covering 40 percent or more of the ground, and (3) large dead trees with a trunk diameter of at least 12 inches (69 Federal Register 53181-5398).

The primary constituent elements of the critical habitat designation include those physical and biological features that support nesting, roosting, and foraging. Vegetation communities and structural attributes used by the owl vary across the range of the subspecies, but consist primarily of mixed conifer forests or canyons. The mixed-conifer, pine-oak communities and canyon

habitat appear to be the most frequently used communities throughout most portions of the subspecies' range (Skaggs and Raitt 1988; Ganey and Balda 1989, 1994; Gutierrez and Rinkevich 1991; USFWS 1995). In Utah, owls utilize canyon habitats (Willey 1998).

Primary constituent elements related to critical habitat in Utah include one or more of the following: (1) presence of water (often providing cooler temperatures and higher humidity than the surrounding areas); (2) clumps or stringers of mixed conifer, pine-oak, pinyon-juniper, and/or riparian vegetation; (3) canyon walls containing crevices, ledges, or caves; and (4) high percent of ground litter and woody debris. The primary constituent elements provide a qualitative description of those physical and biological features necessary to ensure the conservation of the owl in Utah (69 FR 53181).

Although the Mexican spotted owl's entire range covers a broad area of the southwestern United States and Mexico, the Mexican spotted owl does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older uneven-aged forests but also is known to inhabit a physically diverse landscape in the southwestern United States and Mexico. Owls can be found in forested mountains and canyons from southern Utah and Colorado to the mountains of Arizona, New Mexico, western Texas, and into the mountains of northern and central Mexico.

Steep-walled rocky canyonlands provide typical owl habitat within the Utah portion of the Colorado Plateau Recovery Unit. Canyon habitat is used by owls for nesting, roosting, and foraging and includes landscapes dominated by vertical walled rocky cliffs within complex watersheds, including many tributary side canyons. Rock walls must include caves, ledges, and fracture zones that provide protection for nesting and roosting sites. Breeding sites are located below canyon rims; however, it is known that owls use areas outside of the canyons (i.e., rims and mesa tops). Owls nest and roost primarily on cliff faces using protected caves and ledges, and forage in canyon bottoms, on cliff faces and benches, and along canyon rims and adjacent lands. Although it is difficult to rely upon vegetation alone to identify canyon habitat, these areas frequently contain small clumps or stringers of mixed-conifer, ponderosa pine, pine-oak, pinyon-juniper, and/or riparian vegetation (69 FR 53181). Little is known about patterns of habitat use by foraging owls. Willey (1998) documented owl use in Utah to include canyon bottoms and adjacent rims.

Colorado Plateau canyon habitats in Utah are naturally discontinuous and may explain the patchy locations of owls in the region. A study conducted in Zion National Park found owls nesting and roosting in humid, narrow canyons with dense understories (Rinkevich 1991). These canyons provide large cliffs with escape cover to avoid predation, shaded roost sites to avoid high summer temperatures, patches of forest vegetation, and availability of suitable prey.

Historic population size estimates and range of the Mexican spotted owl are unknown; however present population size and distribution are thought to be similar (USFWS 1995). Ninety-one percent of known owls in 1990-1993 occurred on U.S. Forest Service lands, primarily in Arizona and New Mexico. It is unknown why there are fewer owls in Utah and Colorado, but that may be a function of habitat type. Total range wide population estimates are 1,176 to 2,352 owls (69FR 53181, August 31, 2004). Seamans et al. 1999 reported 10 percent or greater population

declines and low survival rates in central Arizona and west-central New Mexico. Gutierrez et al. (2003) documented that the decline in New Mexico was continuing, whereas the decline in Arizona appeared to have stabilized. Wide population fluctuations may be common for Mexican spotted owls (Gutierrez et al. 2003).

Environmental Baseline

Status of the Species within the Action Area

Dr. David Willey and Dan Spotskey modeled Mexican spotted owl habitat based on vegetation type, slope, elevation, aspect, and other factors in 1997 and 2000 (Willey and Spotskey 1997, 2000). Both the 1997 model and the 2000 model are used within Utah to identify potential habitat. Any projects that occur within the modeled potential habitat should be field-verified for actual habitat suitability and, if appropriate, surveys according to protocol should be conducted to determine if Mexican spotted owls occupy the area. The Mexican spotted owl occurs in the eastern and southern thirds of Utah, including Garfield and Kane counties (UDWR 2003).

The Mexican Spotted Owl Recovery Plan was finalized in 1995. Six Recovery Units in the United States were identified based on similarities, or obvious dividing lines, between the following: physiographic provinces, biotic regimes, perceived threats to habitat or individual birds, administrative boundaries, and owl distribution. Suitable habitat and designated critical habitat on public lands managed by the BLM in Utah are within the Colorado Plateau Recovery Unit (USFWS 1995). Five critical habitat units have been delineated in Utah:

Unit CP–11. This unit is located in Iron, Washington, and Kane Counties in southwest Utah, approximately 22 mi (35 km) northeast of St. George. About half of the unit is on BLM owned lands; Zion National Park is the other land owner.

Unit CP–12. This Unit is in the vicinity of the Kaiparowits Plateau and the Cockscomb, in Kane and Garfield Counties. This unit is primarily on the Grand Staircase-Escalante National Monument, which is owned and managed by the BLM. The other land owner is the Forest Service (Dixie National Forest).

Unit CP–13. This unit occurs in Wayne, Garfield, Kane, and San Juan Counties, Utah. It is primarily in the Waterpocket Fold landform extending to Lake Powell. The primary land owner in this Unit is the National Park Service (Capitol Reef National Park and Glen Canyon National Recreation Area). The BLM owns and manages lands within this unit primarily on the Grand Staircase-Escalante National Monument and along the eastern edge of the Unit. The Forest Service (Fishlake National Forest) also owns land, but to a much lesser extent.

Unit CP–14. This Unit lies in Wayne, Garfield, San Juan, and Grand Counties, Utah. It includes the Dark Canyon Primitive and Wilderness areas of the BLM and FS, respectively. This Unit has lands owned and managed by the National Park Service (Canyonlands National Park and Glen Canyon National Recreation Area), the BLM, and the Forest Service (Manti La-Sal National Forest).

Unit CP–15. This unit is located approximately 30 mi (48 km) east of Price, in Carbon and Emery Counties. Situated in the West Tavaputs Plateau, it is located largely along the Desolation Canyon area of the Green River. The BLM is the primary owner and manager of land within this unit.

It is important to note that critical habitat is not the only suitable or occupied habitat available for owls. Critical habitat is only a regulatory delineation of habitat meeting primary constituent elements, and was defined based largely on known localities of nest sites (Protected Activity Centers; PACs) at the time of designation. There is substantial suitable habitat that occurs outside of the designated critical habitat boundaries and these should be assessed using the models and field evaluations as previously described.

Designated critical habitat and suitable habitat occur within the Price BLM Field Office. Approximately, 10,770 acres of designated critical habitat in Unit CP-15 exist within the Price planning area. In addition, there are 4 known nesting sites but no officially designated PACs.

Factors Affecting Species Environment within the Action Area

Threats to this species and its habitat include recreation, grazing, oil and gas exploration and development, and road improvement and development within canyons; loss, fragmentation, or modification of habitat from catastrophic fire and timber harvest within upland forests potentially used for foraging, dispersal, and wintering; and increased predation associated with habitat fragmentation (USFWS 1995).

Effects of the Action

Cultural Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities occurring under this program may increase human presence; equipment and vehicle use; and surface disturbance in Mexican spotted owl habitat. Associated visual and noise disturbances may adversely affect the behavior of spotted owls during breeding, nesting, roosting, or foraging efforts. Vegetation disturbances or removal associated with cultural resources excavations may reduce availability of prey habitat and prey abundance, at least in the short term. As a result, there may be site-specific decreases in nest initiation or nesting success, and displacement. These effects are likely to be short-term and relatively small scale due to the type of activity.

Paleontological Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities occurring under this program may increase human presence; equipment and vehicle use; and surface disturbance in Mexican spotted owl habitat. Associated visual and noise disturbances may adversely affect the behavior of spotted owls during breeding, nesting, roosting, or foraging efforts. Vegetation disturbances or removal associated with cultural resources excavations may reduce availability of prey habitat and prey abundance, at least in the short term. As a result, there may be site-specific decreases in nest initiation or nesting success, and displacement. These effects are likely to be short-term and relatively small scale due to the type of activity.

Fire and Fuels Management

Objectives of fire management are to protect life, property, and resources values from wildfire and restore the natural role of fire in the ecosystem. Major activities associated with the BLM's fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation treatment or disturbance; and surface disturbance; and decrease local air quality in Mexican spotted owl habitats. Associated visual and noise disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, roosting, or foraging activities. Vegetation disturbances or vegetation removal may decrease prey habitat and prey abundance. Soil disturbances and increased erosion may indirectly decrease abundance of prey. Localized effects from smoke may adversely affect owlets or displace owls. As a result of these impacts, there may be site-specific decreases in nest initiation or nesting success, increased potential for displacement, and increased owlet and adult mortality.

Potential impacts from wildland fire use and prescribed fire would be similar to those from wildfire suppression. Non-fire fuels treatments and emergency stabilization and rehabilitation following wildfires may be used to retain or improve range conditions and maintain lower fuel loads in grassland and sagebrush habitats. Negative short term impacts include harassment or displacement; or immediate post-project alteration of key prey habitat components from surface disturbance. Fire management activities could benefit prey populations of Mexican spotted owls in the long-term due to improved forage quality and quantity.

Forestry and Woodland Management

Forest management objectives are to maintain and enhance the health, productivity, sustainability, and biological diversity of forest and woodland ecosystems and to provide a balance of natural resource benefits and uses, including opportunities for commercial and non-commercial harvest of forest and woodland products on a sustainable basis. Forests are managed for multiple uses, such as recreation, livestock grazing, and wildlife habitat. The Forestry and Woodlands Management program also implements silviculture practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest.

Forest resources support activities such as road construction that may occur in or near existing or suitable Mexican spotted owl habitat. However, the impacts of these activities are analyzed and authorized by the lands and realty program.

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation treatment or disturbance; and surface disturbance near or in Mexican spotted owl habitat. Associated visual and noise disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Vegetation disturbances, vegetation removal, or chemical treatment of vegetation may adversely affect prey habitat and prey availability, and therefore, adversely affect Mexican spotted owls and their young. Soil disturbances may increase erosion, adversely affect soil stability, and adversely affect prey habitat and prey abundance. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for Mexican spotted owl prey species. As a result, there may be decreases in nest initiation or nesting success, and decreased adult and owlet fitness.

Geology and Minerals Management

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

These occurrences may increase human presence; equipment and vehicle use; vegetation disturbance or removal; soil disturbances; invasive plant species; and pollutants in Mexican spotted owl habitat. Associated noise and visual disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may adversely affect availability of quality and quantity of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and decrease prey habitat. Some ancillary equipment associated with energy development (e.g., transmission lines, oil pits) may result in direct mortality of owls if they become impinged on the lines or caught in the pits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for Mexican spotted owl prey species. Pollutants in the area may affect Mexican spotted owls through adverse effects to prey populations. As a result of these impacts, there may be decreases in nest initiation or nesting success, and decreased adult or owlet fitness.

Hazardous Materials Management

Activities conducted under the hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Mineral developments, pipelines, and roads occur within all of the planning areas analyzed in this document, and have some potential to occur in Mexican spotted owl habitat. Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation treatment or disturbance; and surface disturbance in Mexican spotted owl habitat. Associated noise and visual disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators and increase predation; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and adversely impact prey habitat. As a result, there may be decreases in nest initiation or nesting success, and decreased adult and owlet fitness.

Lands and Realty Management

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way. Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation disturbance; and surface disturbance in Mexican spotted owl habitat. Associated noise and visual disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Construction of power lines or other infrastructure may result in electrocutions, entanglements, or collisions with flying birds, resulting in possible mortality. Vegetation disturbances or vegetation removal may adversely affect availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and adversely affect prey habitat. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for Mexican spotted owl prey species. Exchange or sales of lands may lead to habitat fragmentation and loss. As a result, there may be decreases in nest initiation or nesting success, and decreased adult and owlet fitness.

Livestock Grazing Management

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire and Fuels Management, or vegetative treatments – see Vegetation Management). Other range

improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder wildlife species: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation disturbance; and minor surface disturbance in Mexican spotted owl habitat. Associated visual and noise disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Vegetation disturbances, vegetation removal, or vegetation alteration may result in less dense vegetation, more invasive plant species, fragmented prey habitat and adverse affects to availability of prey habitat and prey abundance. Soil disturbances may increase erosion, adversely affect soil stability, and adversely affect prey habitat. As a result, there may be decreases in nest initiation or nesting success, and increased adult and owlet mortality.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about recreational resources, and assessing effects of recreational use on the natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Authorized activities under this program have the potential to increase human presence; equipment and vehicle use; vegetation disturbance; and surface disturbance in Mexican spotted owl habitat. Associated visual and noise disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may adversely affect the availability and quality of prey habitat and prey abundance. Soil disturbances may increase erosion, adversely affect soil stability, and adversely affect prey habitat. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for Mexican spotted owl prey species. As a result, there may be decreases in nest initiation or nesting success, and decreased adult and owlet fitness.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Potential adverse impacts to Mexican spotted owl suitable and designated critical habitat may result from land treatments occurring within watersheds. Many of these activities are meant to benefit soil resources and watersheds by reducing soil loss and reclaiming surface disturbances or unnecessary roads. However, activities occurring under this program may also increase human presence; equipment and vehicle use; vegetation manipulation; and surface disturbance in Mexican spotted owl habitat. Short-term adverse impacts may include, but not be limited to: disruption of normal breeding, nesting, foraging, and roosting behaviors (associated with noise and visual disturbances); decreased nesting habitat; and decreased prey habitat. Long-term benefits may include increased nesting success, increased prey abundance, and increased survival.

Vegetation Management

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation treatment or disturbance (mechanical, chemical, biological); and surface disturbance in Mexican spotted owl habitat. Associated visual and noise disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Vegetation alteration, removal, or inadvertent chemical treatment may adversely affect availability and quality of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and adversely affect prey species habitat. As a result, there may be site-specific decreases in nest initiation or nesting success, and decreased owl fitness. Long-term benefits may include increased nesting success, increased prey abundance, and increased survival.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

Activities occurring under this program may increase human presence; equipment, helicopter, and vehicle use; vegetation treatment or disturbance; and surface disturbance in Mexican spotted owl habitat. Associated visual and noise disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may adversely affect availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, increase sediment deposits, and habitat for prey species. Short-term adverse impacts may include, but not be limited to: fragmented prey habitat; decreases in nest initiation or nesting success; and decreased adult and owlet fitness.

Fish and Wildlife Management

This program aims to maintain biological diversity, improve habitat for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation treatment or disturbance; and surface disturbance in Mexican spotted owl habitat. Associated visual and noise disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may adversely affect availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, increase sediment deposits, and habitat for prey species. Short-term adverse impacts may include, but not be limited to: fragmentation of prey habitat; decreased nest initiation or nesting success; decreased adult and owlet fitness; and alterations of water distribution within occupied habitat of the Mexican spotted owl. In general, long-term efforts to improve the health of riparian habitats may benefit Mexican spotted owls by increasing prey abundance.

Transportation Access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Authorized activities under this program have the potential to increase human presence; equipment and vehicle use; vegetation disturbance; and surface disturbance in Mexican spotted owl habitat. Associated noise and visual disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may adversely affect the availability and quality of prey habitat and prey abundance. Soil disturbances may increase erosion, adversely affect soil stability, and adversely affect prey habitat. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for Mexican spotted owl prey species. As a result, there may be decreases in nest initiation or nesting success, and decreased adult and owlet fitness. There is some potential for owls to be killed in vehicle collisions on roadways.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to the Mexican spotted owl and designated critical habitat under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' critical, suitable, or potential habitat.
- Encroachment of human development into a species' critical, suitable, or potential habitat.
- Fire management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah
    - County Governments in Utah
    - Local Governments in Utah
    - Private landholders in Utah

Mexican spotted owls occur throughout the action area, generally as year-around residents (Ganey and Block 2005). In these areas, Mexican spotted owls locations are surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Mexican spotted owls are susceptible to activities on State and private lands. Many of these activities, such as livestock grazing, oil and gas exploration and development, human population expansion and associated infrastructure (increased trails and roads) development, research, and recreation activities (including OHV use and any activities that increase human presence), are expected to continue on State and private lands within the Mexican spotted owl's range. Contributing as cumulative effects to the proposed action, these activities will continue to affect Mexican spotted owls' productivity with disturbances to breeding, nesting, and foraging behaviors and further fragmenting habitat of prey populations.

Conclusion

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including the resource protection measures that were incorporated into the project design.

After reviewing the current status of the Mexican spotted owl and its critical habitat, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the USFWS's biological opinion that the Price BLM Field Office Resource Management Plan, as proposed, is not likely to jeopardize the continued existence of the Mexican spotted owl, and is not likely to destroy or adversely modify designated critical habitat. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the BLM Resource Management Plan. If project design cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated.
2. All site-specific projects designed under the proposed BLM Resource Management Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

Southwestern willow flycatcher (*Empidonax traillii extimus*)

Status of Species

Species/Critical Habitat Description

The southwestern willow flycatcher (*Empidonax traillii extimus*) is a small passerine bird associated with riparian habitats and a subspecies of *Empidonax traillii*. This species was listed as endangered under the Endangered Species Act of 1973, as amended (ESA), on February 27, 1995 (USFWS 1995). On October 19, 2005, 120,824 acres of critical habitat were designated for southwestern willow flycatchers across Arizona, New Mexico, California, Nevada, and Utah (USFWS 2005). Within Utah, critical habitat was only designated along the Virgin River in Washington County, an area not part of this consultation. Therefore, there will not be any further mention of critical habitat for southwestern willow flycatchers in this consultation.

The southwestern willow flycatcher is a small bird, approximately 15 centimeters (cm) (5.75 inches) long. It has a grayish-green back and wings, whitish throat, light grey-olive breast, and pale yellowish belly. Two wing bars are visible; the eye ring is faint or absent. The upper mandible is dark, the lower is light. The southwestern willow flycatcher is one of four currently recognized subspecies of the willow flycatcher (*E. traillii*) (Hubbard 1987; Unitt 1987; Sogge 2000; USFWS 2001 and 2002). The *E. t. extimus* subspecies was first described by Phillips (1948) and later re-evaluated and accepted as a subspecies by Unitt (1987) and Browning (1993).

The *E. t. extimus* is paler than the other willow flycatcher subspecies and also differs in morphological characteristics: e.g., wing: tail ratio, wing formula; and bill length (Unitt 1987 and 1997; Browning 1993; USFWS 2001 and 2002). These differences are difficult to distinguish and are not reliable characteristics for field identification. The characteristic song of willow flycatcher species is often referred to as a *"fitz-bew"*. Travis (1996) and Sedgwick (1998 and 2001) suggest that clinal variations in willow flycatcher songs also serve to distinguish between subspecies, but this too is unreliable as a definitive field identification tool. In southern Utah, southwestern Colorado, and perhaps New Mexico, clinal gradations of the *E. t. extimus* and Great Basin/Rocky Mountain willow flycatcher (*E. t. adastus*) are thought to occur (USFWS 2002). Phillips et al. (1964) suggested that the *E. t. extimus* may be typical of lower elevations, and in northern parts of its range (including Utah), clinal gradation with the Great Basin subspecies may exist with increasing elevation and latitude. Recent research (Paxton 2000) concluded that the *E. t. extimus* is genetically distinct from the other willow flycatcher species. However, clinal gradation increases the difficulty of subspecies identification without genetic testing.

Life History and Population Dynamics

Male southwestern willow flycatchers generally arrive at breeding grounds first, with females typically arriving a week or two later. Males are usually monogamous, but polygamy has been recorded (Sogge et al. 1997). Nests are usually built within a week of pair formation. Egg-laying begins as early as May but typically occurs in mid-June. The female provides initial care of the nestlings, the role of the male increases with the age and size of the young. Young typically fledge at 12 to 15 days of age, usually between June and mid-August. Second clutches are common if the first attempt is unsuccessful. Territory size varies among the southwestern

willow flycatcher, probably due to differences in population density, habitat quality, and nesting stage.

Open, cup-shaped nests are typically constructed in the fork of a branch. Historically, most southwestern willow flycatcher nests (75-80%) were constructed in willows. Currently, the species nests in a variety of plant species, including exotic species such as tamarisk.

Information on breeding site fidelity and persistence is limited. Studies of banded birds (Whitfield and Strong 1995; Whitfield and Enos 1996) report varying rates of nestlings returning to study sites to breed. Sogge and Tibbits (1994) reported the return of breeding populations to sites that had been unoccupied for several years, indicating that a habitat cannot be assumed unsuitable or unoccupied in the long term based on absence of southwestern willow flycatchers during a single year.

The southwestern willow flycatcher breeds in different types of dense riparian habitats across a large elevational and geographic area. Although the other willow flycatcher subspecies may breed in shrubby habitats away from water, the southwestern willow flycatcher breeds in patchy to dense riparian habitats along streams or other wetlands, near or adjacent to surface water or underlain by saturated soil. Occupied southwestern willow flycatcher sites consist of dense vegetation in the patch interior that is generally 3 to 4 m (10 to 13 ft) above ground, or in aggregates of dense patches interspersed with openings. Saturated soil is present at or near the breeding site during wet or non-drought years (Sogge et al. 1997, Sogge and Marshall 2000, USFWS 2001 and 2002). Rangewide, common tree and shrub species comprising nesting habitat include willows (*Salix* spp.), seepwillow or mulefat (*Baccaharis* spp.), box elder (*Acer negundo*), stinging nettle (*Urtica* spp.), blackberry (*Rubus* spp.) cottonwood (*Populus* spp.) arrowweed (*Tessaria sericea*), tamarisk or saltcedar (*Tamarix ramosissima*), and Russian olive (*Elaeagnus angustifolia*). Dominant plant species, size and shape of habitat patch, canopy structure, vegetation height, etc., vary widely across the *E. t. extimus*'s range. In Utah, the southwestern willow flycatcher is typically found in mixed native and exotic riparian species habitats, generally dominated by coyote willow, tamarisk and Russian olive (Johnson et al. 1999a and 1999b).

Little specific information is known about migration and wintering ecology of the southwestern willow flycatcher (Yong and Finch 1997, Finch et al. 2000). Willow flycatchers (all subspecies) breed in North America, but winter in Mexico, Central America, and possibly northern South America (Phillips 1948, Stiles and Skutch 1989, Ridgely and Tudor 1994, Howell and Webb 1995, Sogge et al. 1997).

Status and Distribution

The historical breeding range of the southwestern willow flycatcher included southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and extreme northwestern Mexico (Hubbard 1987; Unitt 1987; Browning 1993; USFWS 2002). The flycatcher's current range is similar to the historical range, but the quantity of suitable habitat within that range is much reduced from historical levels. The flycatcher occurs from near sea level to over 2600 m (8500 ft), but is primarily found in lower elevation riparian habitats (USFWS 2002). Throughout its range, the flycatcher's distribution follows that

of its riparian habitat; relatively small, isolated, widely dispersed locales in a vast arid region (USFWS 2002 Surveys for the southwestern willow flycatcher have been conducted by the UDWR.

The Recovery Plan (USFWS 2002) divides the southwestern willow flycatcher's breeding range into six Recovery Units, which are subdivided into Management Units. Recovery Units are defined based on large watershed and hydrologic units; standardized boundaries of river basin units within the U.S. Within each of the six Recovery Units, multiple Management Units are delineated based on a geographic area representing all or part of a surface drainage basin, a combination of drainage basins, or a distinct hydrologic feature. The outer limits of both the Recovery Unit and Management Unit boundaries are defined by the southwestern willow flycatchers' range (USFWS 2001 and 2002).

The State of Utah falls within the Lower Colorado and Upper Colorado Recovery Units. The Upper Colorado Recovery Unit covers much of the four-corners area of southern Utah, southwestern Colorado, northeastern Arizona, and northwestern New Mexico. The northern boundary of the Upper Colorado Recovery Unit is delineated by the northern range boundary of the southwestern willow flycatcher. Ecologically, this region may be an area of clinal gradation between the southwestern willow flycatcher and the Great Basin willow flycatcher. The Lower Colorado Recovery Unit is a geographically large and ecologically diverse Recovery Unit, encompassing the Colorado River and its major tributaries, from Glen Canyon Dam downstream to the Mexico border (USFWS 2001 and 2002).

As previously discussed, recent genetic work (Paxton 2000) verified *E. t. extimus* genetic stock in the San Luis Valley of south-central Colorado and the Virgin River in Utah. Paxton's (2000; as cited in USFWS 2002) research showed that the northern boundary for southwestern willow flycatchers was generally consistent with that proposed by Unitt (1987) and Browning (1993), and subsequently used in the Final Recovery Plan (USFWS 2002). Paxton's (2000) research further illustrated that the willow flycatcher in central Utah does not have the genetic markers of *E. t. extimus* and is more closely related to *E. t. adastus*. However, because of the absence of flycatchers in the lower- to mid-elevations of the Colorado Plateau in southern Utah and southwestern Colorado, Paxton (2000; as cited in USFWS 2002) did not address potential sub-specific differences resulting from elevation or habitat differences and watershed boundaries. Analysis of willow flycatcher vocalizations in central Utah also suggests association with *E. t. adastus*. The Final Recovery Plan (USFWS 2002) adopts a range boundary that reflects Paxton's (2000) and Sedgwick's (2001) results; the northern extent of southwestern willow flycatchers is confined to the southern portions of Utah. In the Recovery Plan, the USFWS acknowledges that new data may result in refinements to the northern range boundary currently recognized (USFWS 2002). This is based on the limited genetic information in portions of central and eastern Utah, particularly along major drainages including the Colorado and Green Rivers. Therefore, the USFWS Utah Field Office considers potential distribution for southwestern willow flycatchers to possibly extend further north than the Recovery Plan boundary.

The reasons for the decline of the southwestern willow flycatcher and current threats to its conservation are numerous, complex and inter-related (USFWS 2001, 2002). The major factors threatening the species include habitat loss and modification; invasion of breeding habitats by

exotic plant species; brood parasitism by brown-headed cowbirds; the vulnerability of small southwestern willow flycatcher population numbers; and stresses that occur to the species during migration and in wintering habitats. These factors vary in severity over the southwestern willow flycatcher's range, and several are likely to have cumulative and synergistic effects (USFWS 1997).

For more information regarding the life history and population dynamics, see the Final Recovery Plan for the Southwestern Willow Flycatcher (USFWS 2002).

Environmental Baseline

Status of the Species within the Action Area

E. t. extimus may have always been rare in southern Utah (Behle pers. comm. cited in Unitt 1987). However where habitat existed along the Colorado River and its tributaries in southeastern Utah, it was thought to be a locally common breeding and migratory resident (Behle and Higgins 1959). Few data are available on population trends in southern Utah. There is a lack of genetic information to draw a definitive range boundary, particularly as it pertains to the central and eastern portions of the State (USFWS 2002), including the planning area. However, there is the potential for the flycatcher to occur within the planning boundary, and thus it is analyzed in this biological opinion.

Factors Affecting Species Environment within the Action Area

The main threats to the species have been attributed to loss, modification, and fragmentation of riparian breeding habitat, loss of wintering habitat, and brood parasitism by the brown-headed cowbird (Whitfield 1990; Sferra et al. 1995; Sogge et al. 1997; McCarthey et al. 1998; USFWS 2002). The southwestern willow flycatcher and its habitat are threatened by urban, recreational, and agricultural development, water diversion and groundwater pumping, channelization, dams, and livestock grazing (USFWS 2002). Fire is an increasing threat to southwestern willow flycatcher habitat (Paxton et al. 1996), especially in monotypic salt cedar vegetation (DeLoach 1991) and where water diversions and/or groundwater pumping desiccates riparian vegetation (Sogge et al. 1997).

Floodplains and associated riparian vegetation were once dominated by a wide band of trees, principally cottonwood and willows (Horton 1977). Arrowweed and mesquite were dominant in many upland areas (Horton 1977). Graf (1982) reports that tamarisk was introduced into the United States in the early 1800s and into the American Southwest by 1856. From 1925 through 1960, tamarisk rapidly spread throughout Utah with the greatest degree of invasion occurring from 1935 to 1955 (Christensen 1962). Tamarisk changes channel morphology from braided, shallow systems to ones that are constrained, centralized, and deeper. Dense tamarisk vegetation reduces the channel capacities of normal flow events and has been cited as the cause of disastrous flooding (Graf 1982). Southwestern willow flycatcher habitat may be very vulnerable to the changes tamarisk invasion brings about in stream morphology and ecology. The effects of tamarisk to breeding southwestern willow flycatchers may not be as apparent as the effects to their habitat. Owen and Sogge (2002) studied 12 parameters of physiological condition of 130 southwestern willow flycatchers in native vegetation and tamarisk and found no evidence that flycatchers breeding in tamarisk exhibit poorer nutritional condition or are suffering negative

physiological affects. However, breeding success and the number of species supported within a tamarisk stand is reduced (Anderson et al. 1977).

Effects of the Action

Cultural Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities occurring under this program may increase human presence; equipment and vehicle use; and surface disturbance in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging efforts. Vegetation disturbances or removal may decrease the availability of nesting habitat; decrease cover from predators and increase predation; and decrease the availability of prey habitat. As a result, there may be decreases in nest initiation or nesting success. There is some potential for vegetation removal to result in nestling mortality.

Paleontological Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities occurring under this program may increase human presence; equipment and vehicle use; and surface disturbance in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging efforts. Vegetation disturbances or removal may decrease the availability of nesting habitat; decrease cover from predators and increase predation; and decrease the availability of prey habitat. As a result, there may be decreases in nest initiation or nesting success. There is some potential for vegetation removal to result in nestling mortality; however implementation of the applicant committed conservation measures should greatly minimize this potential.

Fire and Fuels Management

Objectives of fire management are to protect life, property, and resources values from wildfire and restore the natural role of fire in the ecosystem. Major activities associated with the fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation treatment or disturbance; and surface disturbance in southwestern willow

flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal decrease availability of nesting habitat; decrease cover from predators and increase predation; and decrease prey habitat. As a result, there may be decreases in nest initiation or nesting success, and decreased adult or nestling/fledgling fitness. There is some potential for fire management activities to result in adult or nestling mortality; however implementation of the applicant committed conservation measures should greatly minimize this potential.

Potential impacts from wildland fire use and prescribed fire would be similar to those from wildfire suppression. Non-fire fuels treatments and emergency stabilization and rehabilitation following wildfires may be used to retain or improve range conditions and maintain lower fuel loads in grassland and sagebrush habitats. Negative impacts include harassment or displacement; or immediate post-project alteration of adjacent habitat from surface disturbance.

Long-term benefits of this program, as vegetation is reestablished, may include increased nesting success, increased insect prey abundance, and decreased predation.

Forestry and Woodland Management

Forest management objectives are to maintain and enhance the health, productivity, sustainability, and biological diversity of forest and woodland ecosystems and to provide a balance of natural resource benefits and uses, including opportunities for commercial and non-commercial harvest of forest and woodland products on a sustainable basis. Forests are managed for multiple uses, such as recreation, livestock grazing, and wildlife habitat. The forestry and woodlands management program also implements silviculture practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest.

Forest resources support activities such as road construction may occur in or near existing or suitable southwestern willow flycatcher habitat. Impacts associated with these activities are described under the Lands and Realty Program effects analysis.

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation treatment or disturbance; and surface disturbance in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation disturbances, vegetation removal, or chemical treatment of vegetation decrease availability of nesting habitat; decrease cover from predators and increase predation; and decrease prey populations and prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for southwestern willow flycatchers and their prey species. As a result, there may be decreases in nest initiation or nesting success, and decreased adult fitness. There is some potential for vegetation removal to result in nestling mortality; however implementation of the applicant committed conservation measures should greatly minimize this potential.

Geology and Minerals Management

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may increase human presence; equipment and vehicle use; surface disturbance; and increased occurrence of chemical leaks in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators and increase predation; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for southwestern willow flycatcher and their prey species. Pollutants in the area may affect southwestern willow flycatchers, prey populations, and vegetation. As a result of these impacts, there may be decreases in nest initiation or nesting success and decreased adult and nestling/fledgling fitness. There is some potential for vegetation removal to result in nestling mortality; however implementation of the applicant committed conservation measures should greatly minimize this potential. Ancillary facilities such as oil pits may result in direct mortality of birds if they forage over or become trapped in the pits.

Hazardous Materials Management

Activities conducted under the hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Mineral developments, pipelines, roads, and railroad transportation and access systems occur within all of the planning areas analyzed in this document, and have the potential to occur in southwestern willow flycatcher habitat. Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation treatment or disturbance; and surface disturbance in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators and increase predation; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. As a result of these impacts, there may be decreases in nest initiation or nesting success, and decreased adult and nestling/fledgling fitness. There is some potential for vegetation removal to result in nestling mortality; however

implementation of the applicant committed conservation measures should greatly minimize this potential.

Lands and Realty Management

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way. Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), vegetation disturbance, and surface disturbance in southwestern willow flycatcher habitat. Associated noise disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators and increase predation; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for southwestern willow flycatchers and their prey species. Exchange or sales of lands may lead to fragmentation and loss of the species suitable habitat. As a result, there may be decreases in nest initiation or nesting success, and decreased adult and nestling fitness. There is some potential for activities authorized under this program to result in bird mortality; however implementation of the applicant committed conservation measures should greatly minimize this potential.

Livestock Grazing Management

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire and Fuels Management, or vegetative treatments – see Vegetation Management). Other range improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder some wildlife species: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase human presence; vegetation disturbance; and minor surface disturbance in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation disturbances, vegetation removal, or vegetation alteration may result in less dense vegetation; an increase in invasive plant species; increased fragmented habitat; reduced availability of nesting habitat; decreased cover from predators and increased predation; and decreased availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. As a result, there may be decreases in nest initiation or nesting success, and decreased adult or nestling/fledgling fitness. There is some potential for vegetation removal, particularly prescribed fire, to result in nestling or adult mortality; however implementation of the applicant committed conservation measures should minimize this potential.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about BLM's recreational resources, and assessing effects of recreational use on the natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Authorized activities under this program have the potential to increase human presence; equipment and vehicle use; vegetation disturbance; and surface disturbance in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators and increase predation; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for southwestern willow flycatchers and their prey species. As a result, there may be decreases in nest initiation or nesting success, and decreased adult or nestling/fledgling fitness. There is some potential for vegetation removal to result in nestling mortality; however implementation of the applicant committed conservation measures should greatly minimize this potential.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation manipulation; stream alteration; and minor surface disturbance in southwestern

willow flycatcher habitat. Short-term adverse impacts may include, but not be limited to: disruption of normal breeding, nesting, and foraging behaviors (associated with noise and visual disturbances); decreased nesting habitat; decreased cover from predators and increased predation; insect prey habitat; and alterations of water distribution within occupied habitat for southwestern willow flycatchers. There is some potential that work in riparian areas could result in mortality of nestlings; however implementation of the applicant committed conservation measures should greatly minimize this potential. Long-term benefits may include: increased nesting success, increased insect prey abundance, and decreased predation.

Vegetation Resources

Program objectives are to maintain or improve the diversity of plant communities to support livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation treatment or disturbance (mechanical, chemical, biological); and surface disturbance in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation alteration, removal, or inadvertent chemical treatment may adversely affect availability and quality of nesting habitat; decrease cover from predators and increase predation; and decrease insect prey populations. Release of biological control agents may have site-specific and wide ranging effects that may need to be further considered (refer to the Reinitiation Section of this BO) dependent in part on the release organism, e.g., salt cedar leaf beetle. Soil disturbances may increase erosion, adversely affect soil stability, increase sediment deposits, and alter channel morphology. As a result, there may be decreases in nest initiation or nesting success, and decreased adult and nestling/fledgling fitness. There is some potential for vegetation removal to result in nestling mortality; however implementation of the applicant committed conservation measures should greatly minimize this potential. Long-term benefits may include: increased nesting success, increased insect prey abundance, and decreased predation.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

Activities occurring under this program may increase human presence; equipment, helicopter and vehicle use; vegetation treatment or disturbance; and surface disturbance in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may adversely affect availability of nesting habitat, cover from predators, and insect prey habitat. Soil disturbances may increase erosion, adversely affect

soil stability, and increase sediment deposits. Short-term adverse impacts may include, but not be limited to: disruption of normal breeding, nesting, foraging, and roosting behaviors; decreased nesting habitat; decreased cover from predators and increased predation; decreased insect prey habitat; and alterations of water distribution within occupied habitat for southwestern willow flycatchers.

Fish and Wildlife Management

This program aims to maintain biological diversity, improve habitat on for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase human presence; equipment and vehicle use; vegetation treatment or disturbance; and surface disturbance in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may adversely affect availability of nesting habitat, cover from predators, and insect prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Short-term adverse impacts may include, but not be limited to: disruption of normal breeding, nesting, foraging, and roosting behaviors; decreased nesting habitat; decreased cover from predators and increased predation; decreased insect prey habitat; and alterations of water distribution within occupied habitat for southwestern willow flycatchers. There is some potential for vegetation removal to result in nestling mortality; however implementation of the applicant committed conservation measures should greatly minimize this potential. In some cases, management activities beneficial for one species may be detrimental to another species. In general, long-term efforts to improve the health of riparian habitats may benefit southwestern willow flycatchers by increasing nesting success, increasing insect prey abundance, and decreasing predation.

Transportation and Access Management

The objectives of the transportation and access management program include maintenance of access for public and administrative needs; establishment of a route system that contributes to protection of sensitive resources; accommodates a variety of uses and minimizes user conflicts; and coordination of OHV management.

Activities occurring under this program may increase human presence; equipment and vehicle use; surface disturbance; and increased occurrence of chemical leaks in southwestern willow flycatcher habitat. Associated noise and visual disturbances may adversely affect the behavior of southwestern willow flycatchers during breeding, nesting, or foraging activities. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators and increase predation; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for southwestern willow flycatcher and their prey species. As a result of these impacts, there may be decreases in nest initiation or nesting success, and decreased adult and nestling/fledgling fitness. There is some potential for vegetation removal to result in nestling mortality; however implementation of the applicant committed conservation measures should greatly minimize this potential.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to federally protected southwestern willow flycatchers under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' suitable or potential habitat.
- Encroachment of human development into a species' suitable or potential habitat.
- Fire management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah
    - County Governments in Utah
    - Local Governments in Utah
    - Private landholders in Utah

Few southwestern willow flycatcher breeding sites and territories have been found in Utah. In these areas, southwestern willow flycatcher habitat is surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Southwestern willow flycatchers are susceptible to activities on State and private lands. Many of these activities, such as urban growth and development; construction and operation of dams along major waterways; water retention, diversion, or dewatering of springs, wetlands, or streams; recreation; road construction; fuels-reduction treatments; research; grazing activities (including alteration or clearing of native habitats for domestic animals); oil and gas exploration and development; introduction of non-native plant or wildlife species (which can alter native habitats and alter prey populations); and other associated actions. Increases or changes in cowbird foraging areas (construction of corrals, grazing of domestic stock, placement of bird feeders) and habitat fragmentation may increase the parasitism rate and decrease southwestern willow flycatcher reproduction. Continued and future conversion of floodplain and near shore lands will likely eliminate opportunities to restore floodplains to develop willow flycatcher habitat. Increased recreation, camping, off-road vehicle use, and river trips may harass and disturb breeding birds or impact nesting habitats. Contributing as cumulative effects to the proposed action, these activities will continue to affect southwestern willow flycatcher productivity with disturbances to breeding, nesting, and foraging behaviors and habitat (including areas of designated critical habitat), and further fragmenting habitat.

Conclusion

The conclusions of this biological opinion are based on full implementation of the programs as described in the "Description of the Proposed Action" section of this document, including the conservation measures that were incorporated into the project design.

After reviewing the status of the southwestern willow flycatcher, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the USFWS's biological opinion that the Price BLM Field Office Resource Management Plan, as proposed, is not likely to jeopardize the continued existence of the southwestern willow flycatcher, and is not likely to destroy or adversely modify designated critical habitat. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the BLM Resource Management Plan. If project design cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated.
2. All site-specific projects designed under the proposed BLM Resource Management Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

Last Chance townsendia (*Townsendia aprica*)

Status of Species

Species Description

Last Chance townsendia (*Townsendia aprica*) is a member of the sunflower family; this species is a stemless perennial herb with yellow flower heads submersed in its ground-level leaves (UDWR 2005). Endemic to the Colorado Plateau in Utah, Last Chance townsendia was discovered in Sevier County in 1966 by Stanley L. Welsh and James L. Reveal.

Last Chance townsendia is described as pulvinate-caespitose acaulescent perennial herb from a caudex, 1.5-2.5 cm tall; leaves 7-13 (16) mm long, 1-3.5 mm wide spatulate to oblanceolate, stringose; heads sessile, submersed in leaves; involucres 4-8 mm high, 7-13mm wide; bracts in 3-4 series, lanceolate, fimbriate, red scarious, hyaline-ciliate, the outermost sparsely stringose; rays 13-21, the corollas yellow to golden ventrally, purplish dorsally and grandualar, 4-7mm long; disk corollas yellow, 3.7-.5mm long; achene's 2-2.5mm long, 2 ribbed, the hairs glochidiate; ray pappus 0.7-1 mm long; pappus of disk flowers 4-5 mm long.

Life History and Population Dynamics

Last Chance townsendia reproduction is sexual. Flowering occurs from April to May and fruiting occurs May to June (USFWS 1993). The factors which govern the distribution of Last Chance townsendia are not well known, nor are the long-term population dynamics (USFWS 1993).

Self-pollination is virtually non-existent in Last Chance townsendia (USFWS 1993). Pollination is accomplished by several species of solitary bees: eight species of metallic blue and green megachilid bees in the genus Osmia, and the anthophorid bee *Tetralonia fulvitarsis* (USFWS 1993). A few species of flies (not yet identified) also visit the flowers (USFWS 1993). Seed set seems frequently to be pollinator-limited (USFWS 1993). Lack of pollination may be due to various reasons including low pollinator numbers, inclement weather affecting pollinator flight

activity, and possibly other unidentified factors (Tepedino and Griswold, USDA-ARS Bee Biology and Systematics Laboratory, Logan, Utah, pers. comm., 1991; USFWS 1993).

Status and Distribution

The Last Chance townsendia was listed throughout its range on August 21, 1985 as threatened under the Endangered Species Act of 1973, as amended (ESA). Last Chance townsendia is found at elevations of 6,000 to 8,000 feet (1680 to 2560 meters) within clay, clay-silt, or gravelly clay soils derived from the Blue Gate Shale, and Ferron sandstone members of the Mancos formation, Salt Wash and Brushy Basin members of the Morrison formation and the Carmel formation. The species co-occurs in salt brush and pinyon-juniper communities, commonly on clay or clay silt exposures of the Mancos Shale (Blue Gate Member) at 1860- 2440 meters elevation in western Emery and adjacent eastern Sevier (Welsh et al. 1993). Soils are often densely covered with biological soil crusts (UDWR 2005). The average soil pH of occupied habitats is 7.42 (Armstrong et al. 1991).

Last Chance townsendia is currently known from a series of small populations most of which are in a band less than 5 miles (8 km) wide and 30 miles (48 km) long in Emery, Sevier, and Wayne counties, Utah (USFWS 1993). Most population sites have been found on the Southwest edges of the San Rafael Swell. Populations appear to be isolated. Approximately 29 populations, comprising 70% of the entire species range, have been known to exist on BLM lands; most species sites within these populations are less than an acre in size (USFWS 1993). The remainder of the populations occur on National Forest and National Park Service lands.

Field surveys have been conducted for all Utah BLM *Townsendia aprica* population sites for the years 1991 and 2002-2007 (Robinson 2007) (Table 2).

Table 2. Survey results for Last Chance townsendia populations on BLM lands 1991-2007.

Survey Year	Estimated Population Numbers on BLM Lands
1991	447-1,930
2002	794
2003	536
2004	834
2005	1,098
2006	1,233
2007	1,613

*(Robinson 2007)

Environmental Baseline

Status of the Species within the Action Area

Approximately 29 populations of Last Chance townsendia have been identified on lands administered by the Bureau of Land Management Richfield and Price field offices, with 20% of these populations found in the action area. Overall, the number of known locations of Last

Chance townsendia appears to be decreasing, however, the number of individual plants on locations in the action area are maintaining or slightly increasing. Reasons for decline of known locations are unclear.

Factors Affecting Species Environment within the Action Area

Because Last Chance townsendia is so restricted in its distribution, any event that could result in loss of individuals or habitat within one or more populations is a potential threat to the species survival. Threats to Last Chance townsendia come primarily from mineral and energy development, road building, and livestock trampling and grazing (USFWS 1993). In addition, off-road vehicles within suitable habitat have been cited as a potential localized threat (USFWS 1993, CPC 2005). For more information regarding threats to this species, see the U.S. Fish and Wildlife Service's 1993 Last Chance townsendia Recovery Plan (USFWS 1993).

Effects of the Action

Cultural Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program may increase minor surface disturbance from cultural resource excavations. Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools in suitable Last Chance townsendia habitats. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance, compaction, and erosion; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment and increased plant damage or individual mortality.

Paleontological Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program may increase minor surface disturbance from fossil resource excavations. Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools in suitable Last Chance townsendia habitats. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance, compaction, or erosion; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment and increased plant damage or individual mortality.

Fire and Fuels Management

Major activities associated with the fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Although the BLM does not propose to carry out prescribed fire or non-fire treatments (mechanical and chemical) within suitable habitat for the Last Chance townsendia, wildland fire suppression activities could adversely affect the Last Chance townsendia. Activities under this program may increase foot or motorized traffic and application of chemicals (fire retardants, pesticides, insecticides) in suitable Last Chance townsendia habitats. Associated impacts include: trampling or crushing of individuals; increased soil disturbance; compaction or erosion; removal or degradation of suitable habitat; reduction of the seed bank; reduced pollinator populations; and increase the occurrence of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Forestry and Woodlands Management

The forestry and woodlands management program implements silvicultural practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest. The program allows the treatment of forest insect and disease infestations by spraying, cutting, and removal; and herbicidal spraying of grasses and shrubs. Forest management actions may also include conducting surveys, obtaining easements, pursuing legal access, allowing road development, and installing drain culverts and water bars. Wood collection is also authorized under this program.

Forest resources support activities such as road construction that may occur in or near existing or suitable Last Chance townsendia habitat. However, the impacts of these activities are analyzed and authorized by the lands and realty program.

Although activities authorized under this program are not likely to occur in Last Chance townsendia habitat, there is some potential for individuals to trample Last Chance townsendia plants while harvesting wood products. Known populations of Last Chance townsendia, and potential habitats, have not been specifically protected from fuel wood, Christmas tree, and post and pole harvesting. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Geology and Minerals Resources

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in

surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may increase foot traffic, motorized traffic, significant soil disturbance, and surface development in Last Chance townsendia habitat. Associated impacts include: trampling or crushing of individuals, illegal collection of individuals due to increased human access; removal of suitable habitat, loss, modification or degradation of suitable habitat, reduced seed banks, reduced pollinator populations, increased occurrences of invasive plant species, increased competition from seeded species, and increased erosion. As a result, there may be increased loss of individuals or populations, decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Hazardous Materials Management

Activities conducted under the hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Activities occurring under this program may increase foot traffic, motorized traffic, and significant soil disturbance in Last Chance townsendia suitable habitat. Associated impacts include: trampling or crushing of individuals; removal of suitable habitat; contamination, loss, modification or degradation of suitable habitat; reduced seed banks, reduction of pollinator populations; and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Lands and Realty

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way. Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities authorized under this program may adversely impact Last Chance townsendia with human- and equipment-related soil disturbances. Associated impacts include: trampling or crushing of individuals; illegal collection of individuals due to increased human access; increased soil disturbance, compaction, or erosion; loss, modification or degradation of suitable habitat; and removal of suitable habitat. Land exchanges may contribute to loss, fragmentation, and degradation of suitable Last Chance townsendia habitat. As a result, there may be increased loss of individuals or populations, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Livestock Grazing

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire and Fuels Management, or vegetative treatments – see Vegetation Management). Other range improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder other species within the habitat: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase and concentrate domestic ungulates, increase motorized traffic, and increase surface disturbance from fence and livestock pond construction in Last Chance townsendia suitable habitat. Associated impacts include: trampling or crushing of individuals; increased soil disturbance, compaction or erosion; loss, modification or degradation of suitable habitat; and removal of suitable habitat. As a result, there may be decreased recruitment and increased occurrence of plant damage or individual mortality.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about BLM's recreational resources, and assessing effects of recreational use on the natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Activities occurring under this program may increase human, horse, and motorized traffic in Last Chance townsendia suitable habitat. Associated impacts include: trampling or crushing of individuals; illegal collection of individuals; increased soil disturbance, compaction, or erosion; loss, modification or degradation of suitable habitat; reduced seed banks; and increased occurrences of invasive plant species. As a result, there may be decreased recruitment, and increased occurrence of plant damage or individual mortality.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection

measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Last Chance townsendia habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance, erosion, and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment and increased plant damage or individual mortality.

Vegetation Management

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Management activities occurring under this program may increase foot traffic, motorized vehicle use, and vegetation treatments in Last Chance townsendia suitable habitat. Associated impacts include: trampling or crushing of individuals; impact to individuals or populations from herbicides; loss, modification or degradation of suitable habitat; seed bank impacts and reductions; reduced pollinator populations; and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

Management activities occurring under this program may increase foot traffic, motorized vehicle use, and vegetation treatments in Last Chance townsendia suitable habitat. Associated impacts include: trampling or crushing of individuals; impact to individuals or populations from herbicides; loss, modification or degradation of suitable habitat; seed bank impacts and reductions; reduced pollinator populations; and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Fish and Wildlife Resource Management

This program aims to maintain biological diversity, support UDWR Herd Management Plans, improve habitat on for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase foot traffic, motorized traffic, and/or significant soil disturbance in Last Chance townsendia suitable habitat. Associated impacts include: trampling or crushing of individuals; increased soil disturbance; compaction or erosion; removal of suitable habitat; loss, modification or degradation of suitable habitat; reduced seed banks; reduced pollinator populations; and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Transportation and access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Last Chance townsendia habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; illegal collection of individuals due to increased human access; increased soil disturbance, erosion, and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment and increased plant damage or individual mortality.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to the Last Chance townsendia under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' critical, suitable, or potential habitat.
- Program management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah
    - County Governments in Utah
    - Local Governments in Utah

- Private landholders in Utah

Last Chance townsendia occur primarily within BLM management boundaries. In these areas, Last Chance townsendia locations are surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Last Chance townsendia are susceptible to activities on State and private lands. Many of these activities, such as livestock grazing, oil and gas exploration and development, increased road densities, research, and recreation activities (e.g. off-road vehicles), are expected to continue on State and private lands within the Last Chance townsendia range. Contributing as cumulative effects to the proposed action, all these activities will continue to affect Last Chance townsendia populations by increasing mortalities, injuring plants, and further adversely impacting limited occupied and suitable habitat.

Conclusions

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including the resource protection measures that were incorporated into the project design.

After reviewing the current status of the Last Chance townsendia, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the USFWS's biological opinion that the Price Field Office Resource Management Plan, as proposed, is not likely to jeopardize the continued existence of the Last Chance townsendia. Critical habitat has not been designated for this species. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the BLM Resource Management Plan. If project design cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated.
2. All site-specific projects designed under the proposed BLM Resource Management Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

Wright fishhook cactus (*Sclerocactus wrightiae*)

Status of the Species

Species Description

The Wright fishhook cactus is one of ten recognized species within the *Sclerocactus* genus in the southwest. Mrs. Dorde Wright Woodruff discovered *S. wrightiae* Benson in 1961 "near San Rafael Ridge" in Emery County (Benson 1982). The species occurs in Utah's Emery, Sevier, and Wayne Counties.

Wright fishhook is a small, perennial cactus, generally growing as a single plant with a branched taproot. If damaged, the cactus will form clumps of stems. Stems are mostly pale green and are depressed globose in shape. The stems are 1 to 8 cm long and 4 to 8 cm in diameter. Tubercles are well developed with 1 to 4 central spines, the lower one being hooked. Eight to 11 radial spines spread out from the aerole. The flower is 3 to 4 cm in diameter, 3 to 4 cm long, and

fragrant. Outer petals have reddish white to brown midstripes and white to cream or pinkish margins. The inner petals are white to pink. The stamens have magenta filaments with anthers that are yellow. The magenta filaments are the best character to distinguish Wright fishhook cactus from other species of *Sclerocactus*. Flowering occurs from early April through May and fruits are set in June. The fruits are barrel shaped and 9 to 12 mm long and thick. Seeds are black, 2 mm long and 3.5 mm broad (modified from Clark 2001, Heil and Porter 1994).

Life History and Population Dynamics

Observations of the species indicate that plants less than 2 cm in diameter are seedlings and do not flower, while plants greater than 2 cm but less than 4 cm in diameter flower occasionally but seldom set fruit. Plants with diameters between 4 and 9 cm are mature and reproductive, but at slightly lower rates than plants greater than 9 cm in diameter (Intermountain Ecosystems 1999). The Wright fishhook cactus is known to be a difficult cactus to grow and natural recruitment is apparently rare and episodic (Kass [no date]). A monitoring study conducted by Dr. Kass between 1993 and 2000 at the Giles, Hanksville, and Mesa Butte study sites, concluded that the combination of these and other sources of mortality to the Wright fishhook cactus has resulted in a mortality to recruitment ratio of approximately 2.5 to 1 (i.e., on average, 2.5 plants are lost from the population for every new plant added or "recruited") (Kass 2001).

The plant is almost completely self-incompatible. Pollination is accomplished mostly by native sweat bees (*Halictidae*) (Tepedino 2000). Grafted specimens are not easily cultivated (Mathew 1994). Asexual reproduction is rare, although damaged plants form clumps of stems.

Insects and small mammals are known to forage on Wright fishhook cactus. In the Giles and Mesa Butte populations, the Opuntia borer beetle *(Moneilema semipunctatum)*, a large, black, nocturnal, flightless beetle have been observed foraging on the cactus. There was a 23% mortality rate at the study areas due to beetle foraging, with a disproportionate loss of larger individuals with greater reproductive rates; long-term effects to cactus population levels, if any, are unknown. At the Kass' Hanksville study site, no new plants were recorded by the study after 1995. Other significant sources of natural mortality are the Ord's kangaroo rat (*Dipodomys ordii*) and the white-tailed antelope ground squirrel (*Ammospermophilus leucurus)* (Kass 2001).

Status and Distribution

Wright fishhook cactus was listed as endangered under the Endangered Species Act of 1973, as amended (ESA), on October 11, 1979 (44 FR 58868). No critical habitat has been designated for the species as discussed under Section 4(a)(3) of the ESA. On August 3, 2005, a 90-Day Finding to delist *Sclerocactus wrightiae* was initiated along with the initiation of a 5-Year Review (50 FR 44544).

The Wright fishhook cactus is found on semi-barren sites in salt desert shrub, pinyon/juniper woodland-low shrub, pinyon/juniper woodland-grassland, pinyon/juniper woodland-big sage phase, mixed grassland, and mixed desert shrub communities. The cactus is most commonly found between the elevations of 4200 and 7600 feet (1280-2315 meters).

The Wright fishhook cactus is found on a variety of geologic formations. Neese Investigations (1987) found Wright fishhook cactus most commonly on Curtis Sandstone and least commonly

on Mancos Shale. The study conducted by Kass (1990) in the San Rafael Swell found the cacti to occur most frequently on the Tununk member of the Mancos Shale Formation. Out of 33 sites studied by Clark (2002), the cacti were most abundant on the Summerville formation (eight sites) and the Curtis Formation (six sites). Other geologic formations where the Wright fishhook cactus is found include Morrison, Carmel, Entrada, Dakota, Ferron, and Moenkopi. It appears the Wright fishhook cactus does not solely occur on any particular formation but is most commonly found on the Curtis, Mancos Shale and Summerville Formations.

Soils where the species are found have an overlying layer of fine and medium sized gravels or a cryptobiotic soil surface crust (USFWS 1985, Kass 1990). Soils include a broad range of textures, including clays, sandy silts, fine sands, loam and loamy sand. The pH of occupied soils ranged from 7.85 to 8.6 when tested at three monitoring sites for the cactus (Intermountain Ecosystems 1999). According to Kass (1990) and Neese Investigations (1987), the following physiographic factors are important for the establishment and growth of the Wright fishhook cactus: 1) soils derived from contact of mudstone or siltstone with sandstone; 2) pebbles and/or gravels that litter the soil surface; 3) saline or sodic content of soil; and 4) slopes not exceeding 10 degrees. All of the criteria do not need to be present for the species to occur. Kass (1990) reported at least three of the above factors were present for the populations found in 1988.

The Wright fishhook cactus is known from Emery, Sevier, Wayne, and Garfield counties in south-central Utah. The species occurs in the Canyonlands section of the Intermountain region (Cronquist et al. 1972). Populations of Wright fishhook cactus occur primarily on lands managed by the BLM out of the Price and Price Field Offices and by the National Park Service (NPS) at Capitol Reef National Park. The species is found from the San Rafael Swell in Emery County to the north and extends south to the Waterpocket Fold in Garfield County (Neese Investigations 1987, Kass 1990, Clark 2002). As of April 2005, the cactus has been documented at 264 sites, and recent population estimates for the species range from 4,500 to 21,000 individuals (USFWS 2005).

The majority of the documented populations of the Wright fishhook cactus occur within Richfield Field Office lands. Over 100 known populations of the Wright fishhook cactus, as well as additional potential habitat, have been documented within the Richfield Field Office lands, many of them located within the boundaries of Capitol Reef National Park, which lies directly to the west of the Henry Mountains. ("Known populations" consist of documented findings of one or more members of the plant species.) Several populations have been documented in the area between the San Rafael Swell to the north and the Henry Mountains to the south, and within the northern reaches of Capitol Reef National Park and the Waterpocket Fold. A few populations have also been documented in the southern reaches of the Waterpocket Fold.

Potential habitat is widely available in the vicinity of known populations of the species in the planning areas, and because the species is a relative generalist, abundance of habitat is not currently a limiting factor in the conservation or survival of the species. Much of this additional potential habitat has yet to be searched for populations of the Wright fishhook cactus.

Extensive surveys were conducted by Clark (2002) from 1999 to 2004. Sites surveyed by Neese Investigations in 1987 were revisited. Ninety-seven of the Neese Investigation sites on BLM

land reported by were relocated and plants were documented. At sixteen of these sites where cacti were reported by Neese Investigations (1987), plants of the Wright fishhook cactus were not rediscovered (Clark 2002, Clark and Groebner 2003, Groebner et. al. 2004). As a result of those surveys, twenty new sites supporting Wright fishhook cactus have been documented. Eleven sites were found on Capitol Reef National Park and nine on BLM land. About 480 cacti were found at the new sites.

Environmental Baseline

Status of the Species within the Action Area

Within the PFO, the Wright fishhook cactus is found in the southeast portion in lower-elevation areas. The Price FO manages the Muddy Creek ACEC and the I-70 Scenic Corridor ACEC. The Muddy Creek ACEC contains Wright fishhook cactus habitat, but no populations have been documented within the ACEC boundaries. The nearest documented occurrence is a quarter mile outside the ACEC boundary. The I-70 Scenic Corridor ACEC includes 10 documents cacti locations of the Mesa Butte study population. This population also extends outside the ACEC. This population represents a very small portion of the overall numbers of this plant.

Factors Affecting Species Environment within the Action Area

Potential human threats to the Wright fishhook cactus populations and suitable habitat include: recreation, including off-highway vehicle (OHV) use; energy and mineral exploration and development, including associated ancillary facilities and disturbances; infrastructure development; and illegal collection (USFWS 1985). BLM has also documented impacts to the species from trampling, due to livestock grazing. Illegal collection and removal of individuals and populations also constitutes a significant threat to the species (USFWS 1979, Christiansen 1991, BLM 1979).

Effects of the Action

Cultural Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program may increase minor surface disturbance for cultural resource excavations. Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools in suitable Wright fishhook cactus habitats. These activities may result in: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, and increased plant damage or individual mortality.

Paleontological Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program may increase minor surface disturbance for fossil resource excavations. Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools in suitable Wright fishhook cactus habitats. These activities may result in: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, and increased plant damage or individual mortality.

Fire and Fuels Management

Major activities associated with the fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Although the BLM does not propose to carry out prescribed fire or non-fire treatments (mechanical and chemical) within suitable habitat for the Wright fishhook cactus, wildland fire suppression activities could adversely affect the Wright fishhook cactus. Activities under this program may increase foot or motorized traffic and application of chemicals (fire retardants, pesticides, insecticides) in suitable Wright fishhook cactus habitats. Associated impacts include: trampling or crushing of individuals; increased soil disturbance; compaction or erosion; removal or degradation of suitable habitat; reduction of the seed bank; reduced pollinator populations; and increase the occurrence of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Forestry and Woodland Management

Forest management objectives are to maintain and enhance the health, productivity, sustainability, and biological diversity of forest and woodland ecosystems and to provide a balance of natural resource benefits and uses, including opportunities for commercial and non-commercial harvest of forest and woodland products on a sustainable basis. Forests are managed for multiple uses, such as recreation, livestock grazing, and wildlife habitat. The forest management program also implements silviculture practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest.

Forest resources support activities such as road construction that may occur in or near existing or suitable Wright fishhook cactus habitat. However, the impacts of these activities are analyzed and authorized by the lands and realty program.

Although activities authorized under this program are not likely to occur in Wright fishhook cactus habitat, there is some potential for private individuals to trample Wright fishhook cactus individuals while harvesting wood products. Known populations of Wright fishhook cactus, and potential habitats have not been specifically protected from fuel wood, Christmas tree, and post and pole harvesting. As a result, there may be decreased seed production; decreased recruitment; increased illegal collection of individuals due to increased human access; and increased occurrence of plant damage or individual mortality.

Geology and Minerals Resources

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may increase foot traffic, motorized traffic, and significant soil disturbance. These activities may cause trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; loss, modification, or degradation of suitable habitat; reduced seed banks; loss of pollinator populations; increased occurrences of invasive plant species; and increased occurrence of illegal collection due to increased human access due to increased human access. As a result, there may be loss or degradation of cactus populations; decreased Wright fishhook cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Hazardous Materials Management

Activities conducted under the hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Activities occurring under this program in Wright fishhook cactus suitable habitat may increase foot traffic, motorized traffic, and significant soil disturbance. These activities may cause trampling or crushing of individuals, increased soil disturbance; soil erosion and compaction, removal of suitable habitat, contamination, loss, modification or degradation of suitable habitat, reduced seed banks, loss of pollinators, and increased occurrences of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in Wright fishhook cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Lands and Realty

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way. Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities authorized under this program may adversely impact Wright fishhook cactus with human- and equipment-related soil disturbances. Soil disturbance, erosion, and compaction may impact individual plants, modify or degrade suitable habitat, reduce pollinator populations, and reduce the seed bank. Land exchanges may result in fragmentation or degradation of potential Wright fishhook cactus habitat. As a result, there may be loss or degradation of cactus populations; decreased recruitment; and increased occurrence of plant damage and individual mortality.

Livestock Grazing

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire and Fuels Management, or vegetative treatments – see Vegetation Management). Other range improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder other species within the habitat: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase and concentrate domestic ungulate presence, increase motorized traffic, and cause surface disturbance from fence and livestock pond construction in Wright fishhook cactus suitable habitat. These activities may increase the occurrence of trampling, uprooting or crushing of individuals; increase soil disturbance; increase soil erosion and compaction; increase occurrence of exotic plant species; reduce pollinator populations; and modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about BLM's recreational resources, and assessing effects of recreational use on the natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Activities occurring under this program may increase human, horse, and motorized traffic in Wright fishhook cactus suitable habitat. These activities may cause trampling or crushing of individuals; collection of individuals due to increased human access; increased soil disturbance, erosion, and compaction; loss, modification or degradation of suitable habitat; reduced seed banks; and increased occurrences of invasive plant species. As a result, there may be decreased recruitment, and increased occurrence of plant damage or individual mortality.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Wright fishhook cactus habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment and increased plant damage or individual mortality.

Vegetation Management

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Management activities occurring under this program may increase foot traffic, motorized presence, and vegetation treatments in Wright fishhook cactus suitable habitat. These activities may cause trampling or crushing of individuals, increased soil disturbance; soil erosion and compaction; impacts from herbicides; loss, modification or degradation of suitable habitat;

reduced seed banks; reduced pollinator populations; and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

Management activities occurring under this program may increase foot traffic, motorized presence, and vegetation treatments in Wright fishhook cactus suitable habitat. These activities may cause trampling or crushing of individuals, increased soil disturbance; soil erosion and compaction; impacts from herbicides; loss, modification or degradation of suitable habitat; reduced seed banks; reduced pollinator populations; and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Fish and Wildlife Resource Management

This program aims to maintain biological diversity, support UDWR Herd Management Plans, improve habitat on for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase foot traffic, motorized traffic, and/or significant soil disturbance in Wright fishhook cactus suitable habitat. These activities may cause trampling or crushing of individuals, increased soil disturbance, erosion, and compaction; removal of suitable habitat; loss, modification or degradation of suitable habitat; reduced seed banks; reduced pollinator populations; and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Transportation and Access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Activities occurring under this program occurring may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Wright fishhook cactus habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance, erosion, and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of cactus

populations; decreases in Wright fishhook cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to the Wright fishhook cactus under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' critical, suitable, or potential habitat;
- Encroachment of human development into a species' critical, suitable, or potential habitat; and
- Management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah;
    - County Governments in Utah;
    - Local Governments in Utah; and
    - Private landholders in Utah.

Wright fishhook cacti occur primarily within BLM management boundaries. In these areas, Wright fishhook cactus locations are surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Wright fishhook cacti are susceptible to activities on State and private lands. Many of these activities, such as livestock grazing, oil and gas exploration and development, human population expansion and associated infrastructure (increased trails and roads), research, and recreation activities (e.g. off-road vehicles), are expected to continue on State and private lands within the Wright fishhook cactus' range. In addition, illegal collection is reasonably certain to occur. Contributing as cumulative effects to the proposed action, all these activities will continue to affect Wright fishhook cactus populations by decreasing abundance, injuring plants, adversely affecting pollinators, and further adversely impacting occupied and suitable habitat.

Conclusions

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including the resource protection measures that were incorporated into the project design.

After reviewing the current status of the Wright fishhook cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the USFWS's biological opinion that the Price Field Office Resource Management Plan, as proposed, is not likely to jeopardize the continued existence of the Wright fishhook cactus. Critical habitat has not been designated for this species. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the BLM Resource Management Plan. If project design cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated.

2. All site-specific projects designed under the proposed BLM Resource Management Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

San Rafael cactus (*Pediocactus despainii*)

Status of the Species

Species Description

The San Rafael cactus (*Pediocactus despainii*) was first discovered by Kim Despain in 1978 on an anticline in the San Rafael Swell. The San Rafael cactus is usually solitary stemmed, 3.8 to 6.0 centimeters (cm) tall, with a diameter of 3.0 to 9.5 cm. The stem apex is even with the ground level to 5 cm above. Stems are ribbed with tubercles 0.6 to 1.0 cm in length. Spine-bearing areoles are borne at the apex of the tubercle. The areoles are elliptic with moderate spines partially obscuring the stem. Central spines are lacking; 9 to 13 white radial spines are commonly 2 to 6 millimeters (mm) long. Flowers are borne on the end of the tubercle near the apex of the stem, are 1.5 to 2.5 cm in length, and are yellow bronze, peach bronze, or pink with a purple midstripe. Stamens are yellow and stigmas are green. Fruit is 0.9 to 1.1 cm long with a smooth surface, initially green turning reddish-brown with age and dehiscing with a vertical slit along the ovary wall. Seeds are shiny black and kidney shaped with papillate mounds that coalesce into large irregular ridges (Welsh and Goodrich 1980, Welsh et al. 1993).

Life History and Population Dynamics

San Rafael cacti are seasonal. When temperatures increase in mid-February or early March and rainfall is adequate, cacti emerge from just below the surface to flower. Flowering occurs from mid-April through mid-May and fruits are set in mid-May to June. After flowering, the plants shrink into the ground during the hot season and remain underground until the following spring when they resurface with sufficient rains.

Reproduction is sexual (USFWS 1995b) and the specific pollination mechanism and vectors are believed to be wild bees of the Halictidae family (USFWS 1995b). Seedling ecology is unknown (Heil 1984).

Status and Distribution

Due to the rarity of this species and collection pressures, the *P. despainii* was listed as endangered under the Endangered Species Act of 1973, as amended (ESA), on September 16, 1987 (USFWS 1987). No critical habitat has been designated for this species. Identified threats to *P. despainii* have been deemed to be primarily human-related. The primary threat to this species is collection. Other threats include impacts from off-road vehicles, mineral exploration and development, mining activities, and occasional trampling from livestock activities. Some instances of insect larvae infestations have also been observed (USFWS 1987 and 1998).

The San Rafael cactus is found on benches, hill tops, and gentle slopes in desert shrub and juniper woodland communities between the elevations of 4,550 and 6,400 feet (1450 to 2080 meters). It is found on a variety of geologic formations, including Morrison-Brushy Basin, Morrison-Salt Wash, Dakota Sandstone, Moenkopi, Summerville, Morrison-Brushy Basin/Entrada, Summerville/Morrison-Brushy Basin, Carmel Formation, Mancos Shale Formation, Cedar Mountain Shale, and Dakota Sandstone Formations. The San Rafael cactus is known to occur primarily on the Carmel Formation, the Sinbad member of the Moenkopi formation, and the Brushy Basin member of the Morrison Formations. It grows on hills, benches, and flats of the Colorado plateau's semiarid grasslands. This habitat is savannah-like and contains scattered junipers, pinyon pines, low shrubs, and annual and perennial herbs (USFWS 1987).

The San Rafael cactus is known from Wayne and Emery Counties in south central Utah primarily on lands administered by BLM. This species occurs in the Canyon Lands section of the Colorado Plateau Floristic Region (Cronquist et al. 1972). Populations of the species occur primarily on lands managed by the Utah BLM through the Price and Richfield Field Offices, and by the National Park Service (NPS) at Capitol Reef National Park.

Environmental Baseline

Status of the Species within the Action Area

The entire range of the species occurs within Utah, mostly on lands managed by the Bureau of Land Management (USFWS 1995), with one section owned by the State of Utah (52 FR 34914). With its diminutive size and peculiar habit of shrinking underground for several months a year during dry or cold seasons, it is not surprising that *Pediocactus despainii* was only recently discovered. Within the PFO, the San Rafael cactus is found from the central to the southeast portion in lower-elevation areas. There are currently 5 populations of the cactus in the planning area, representing approximately 93% of the species.

Factors Affecting Species Environment within the Action Area

The San Rafael cactus is considered a vulnerable plant species due to low numbers of individuals, the scattered and isolated nature of their occurrence, and their restriction to a limited geographic area due to the specificity of their soil and geologic habitat requirements (USDA et al. 1998). Known threats to the species include collection by cactus collectors; one population was heavily impacted by recreational use of off-road vehicles; and approximately half of each population occurred in areas covered by oil and gas leases and mining claims for gypsum or other minerals (USFWS 1987, TNC 1998). Cattle grazing can be a threat to San Rafael cactus (Walter and Gillett 1998). The San Rafael cactus forms buds in the fall that overwinter to become the next spring's flowers (Heil et al. 1981). These flowering buds at ground level may be vulnerable to surface disturbance, increasing the portion of the year that the species' reproductive capacity is vulnerable (USFWS 1987). USFWS botanists have observed that the species is susceptible to infestation of insect larvae (USFWS 1987). The habitat in which San Rafael cactus occurs is fragile and vulnerable to invasion by aggressive native shrub and tree species or exotic weedy species when the soils are mechanically disrupted or when native grass species are removed (USFWS 1987).

Effects of the Action

Cultural Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities occurring under this program may increase minor surface disturbance for cultural resource excavations. Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools in suitable San Rafael cactus habitats. These activities may cause: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Paleontological Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities occurring under this program may increase minor surface disturbance for fossil resource excavations. Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools in suitable San Rafael cactus habitats. These activities may cause: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Fire and Fuels Management

Major activities associated with the fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Although the BLM does not propose to carry out prescribed fire or non-fire treatments (mechanical and chemical) within suitable habitat for the San Rafael cactus, wildland fire suppression activities could adversely affect the San Rafael cactus. Activities under this program may increase foot or motorized traffic and application of chemicals (fire retardants, pesticides, insecticides) in suitable San Rafael cactus habitats. Associated impacts include: trampling or crushing of individuals; increased soil disturbance; compaction or erosion; removal or

degradation of suitable habitat; reduction of the seed bank; reduced pollinator populations; and increase the occurrence of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Forestry and Woodland Management

Forest management objectives are to maintain and enhance the health, productivity, sustainability, and biological diversity of forest and woodland ecosystems and to provide a balance of natural resource benefits and uses, including opportunities for commercial and non-commercial harvest of forest and woodland products on a sustainable basis. Forests are managed for multiple uses, such as recreation, livestock grazing, and wildlife habitat. The forest management program also implements silviculture practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest.

Forest resources support activities such as road construction that may occur in or near existing or suitable San Rafael cactus habitat. However, the impacts of these activities are analyzed and authorized by the lands and realty program.

Although activities authorized under this program are not likely to occur in San Rafael cactus habitat, there is some potential for private individuals to trample San Rafael cactus individuals while harvesting wood products. Known populations of San Rafael cactus, and potential habitats, have not been specifically protected from fuel wood, Christmas tree, and post and pole harvesting. As a result, there may be decreased seed production; decreased recruitment; increased illegal collection of individuals due to increased human access; and increased occurrence of plant damage or individual mortality.

Geology and Minerals Resources

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may increase foot traffic, motorized traffic, significant soil disturbance; soil erosion and compaction, and surface development in San Rafael cactus habitat. These activities may cause trampling or crushing of individuals, removal of suitable habitat, loss, modification or degradation of suitable habitat, reduced seed banks, reduced pollinator populations, increases the occurrence of invasive plant species, and increased loss of individuals to illegal collection. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Hazardous Materials Management

Activities conducted under the BLM's hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Activities occurring under this program may increase foot traffic, motorized traffic, and significant soil disturbance in San Rafael cactus suitable habitat. These activities may cause trampling or crushing of individuals, removal of suitable habitat, increased soil disturbance; soil erosion and compaction, loss, modification or degradation of suitable habitat, reduced seed banks, reduced pollinator populations, and increased invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Lands and Realty

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way. Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities authorized under this program may adversely impact San Rafael cactus with human- and equipment-related soil disturbances. Soil disturbance will impact individual plants, increased soil disturbance; soil erosion and compaction, modify or degrade suitable habitat, and reduce the seed bank. Land exchanges or sales may increase fragmentation or degradation of suitable San Rafael cactus habitat. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Livestock Grazing

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire and Fuels Management, or vegetative treatments – see Vegetation Management). Other range

improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder other species within the habitat: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase and concentrate domestic ungulate presence, increase motorized traffic, and cause surface disturbance from fence and livestock pond construction in San Rafael cactus suitable habitat. These activities may increase the occurrence of trampling, uprooting or crushing of individuals; increase soil disturbance; increase soil erosion and compaction; increase occurrence of exotic plant species; reduce pollinator populations; and modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about BLM's recreational resources, and assessing effects of recreational use on the natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Activities occurring under this program may increase human, horse, and motorized traffic in San Rafael cactus suitable habitat. These may cause trampling or crushing of individuals, collection of individuals, increased soil disturbance; soil erosion and compaction; loss, modifications or degradation of suitable habitat, reduced seed banks, and increased occurrences of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Activities occurring under this program occurring may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable San Rafael cactus habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or

alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Vegetation Management

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Management activities occurring under this program may increase foot traffic, motorized presence, and vegetation treatments in San Rafael cactus suitable habitat. These activities may cause trampling or crushing of individuals, increased soil disturbance; soil erosion and compaction; effects from herbicides, loss, modification or degradation of suitable habitat, seed bank impacts and reductions, reduced pollinator populations, and increased invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

Management activities occurring under this program may increase foot traffic, motorized presence, and vegetation treatments in San Rafael cactus suitable habitat. These activities may cause trampling or crushing of individuals, increased soil disturbance; soil erosion and compaction; effects from herbicides, loss, modification or degradation of suitable habitat, seed bank impacts and reductions, reduced pollinator populations, and increased invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Fish and Wildlife Resource Management

This program aims to maintain biological diversity, support UDWR Herd Management Plans, improve habitat on for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase foot traffic, motorized traffic, and/or significant soil disturbance in San Rafael cactus suitable habitat. These activities may cause trampling or crushing of individuals, removal of suitable habitat, loss, modification or

degradation of suitable habitat, reduced seed banks, reduced pollinator populations, and increased occurrences of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Transportation and Access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Activities occurring under this program occurring may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable San Rafael cactus habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in San Rafael cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to the San Rafael cactus under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' critical, suitable, or potential habitat;
- Encroachment of human development into a species' critical, suitable, or potential habitat; and
- Management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah;
    - County Governments in Utah;
    - Local Governments in Utah; and
    - Private landholders in Utah.

San Rafael cacti occur primarily within BLM management boundaries. In these areas, San Rafael cactus locations are surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. San Rafael cacti are susceptible to activities on State and

private lands. Many of these activities, such as livestock grazing, oil and gas exploration and development, research, human population expansion and associated infrastructure (increased trails and roads), and recreation activities (e.g. off-road vehicles), are expected to continue on State and private lands within the San Rafael cactus' range. In addition, illegal collection is reasonably certain to occur. Contributing as cumulative effects to the proposed action, all these activities will continue to affect San Rafael cactus populations by decreasing abundance, injuring plants, adversely affecting pollinators, and further adversely impacting occupied and suitable habitat.

Conclusions

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including the conservation measures that were incorporated into the project design.

After reviewing the current status of the San Rafael cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the USFWS's biological opinion that the Price Field Office Resource Management Plan, as proposed, is not likely to jeopardize the continued existence of the San Rafael cactus. Critical habitat has not been designated for this species. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the BLM Resource Management Plan. If project design cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated.
2. All site-specific projects designed under the proposed BLM Resource Management Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

Winkler cactus (*Pediocactus winkleri*)

Status of the Species

Species Description

Winkler cactus (*Pediocactus winkleri*) was first discovered by Agnes Winkler in the late 1960's. The Winkler cactus is a small, subglobose, leafless cactus. The species' stems are solitary or clumped, 3.9 to 6.8 cm tall, with a diameter of 2.7 to 5.0 cm. The stem apex is even with ground level to 5 cm above. Stems are ribbed with tubercles 0.4-0.7 cm long. Spine-bearing areoles are borne at the apex of the tubercles. The areoles are elliptic and densely wooly pubescent with spines obscuring or partially obscuring the stem. Central spines are lacking; radial spines commonly number 9 to 11. The spines, 1.5-4mm long, spread downward with tips tapering from bulbous bases. Flowers are 1.7 to 2.2 cm in length with peach to pink color. Stamens are yellow and stigmas are green. The fruit is 0.7 to 1.0 cm long with a smooth surface, initially green turning reddish-brown with age and dehiscing with a vertical slit along the ovary wall. Seeds are shiny black with papillate mounds that coalesce into large irregular ridges (Heil 1979, Welsh et al. 1993).

Life History and Population Dynamics

Winkler cacti are seasonal. When temperatures increase in mid-February or early March and rainfall is adequate, cacti emerge from just below the surface to flower. Flowering occurs from mid-April through mid-May and fruits are set in mid-May to June. After flowering, the plants shrink into the ground during the hot season and remain underground until the following spring when they resurface with sufficient rains. No studies have been completed on pollination of the Winkler cactus. Reproduction is presumed to be sexual.

Status and Distribution

Due to the rarity of this species and collection pressures, Winkler cactus was designated as a threatened species on August 20, 1998 (63 FR 44587). No critical habitat is designated for this species.

The Winkler cactus is endemic to specific, fine textured derived from the Dakota Formation and the Brushy Basin Member of the Morrison Formation in the lower Fremont River and Muddy Creek drainages. It occurs on rocky, alkaline hill tops and benches, and gentle slopes in on barren, open sites in salt desert shrub communities. Soils are characterized as silty or clay-like primarily derived from Dakota geologic formation (Neese 1987). *P. winkleri* is found at elevations ranging between 1490 to 2010 meters (4890 to 6595 feet).

The Winkler cacti are known in Wayne and Emery Counties in south central Utah. Populations of the species occur primarily on lands managed by the Utah BLM through the Price and Richfield Field Offices, and by the National Park Service (NPS) at Capitol Reef National Park. The range of *P. winkleri* occurs across the landscape in a narrow arc extending from Notom in central Wayne County to Hartnet Draw in southwestern Emery County, Utah. This area extends about 48 km (30 miles) but plants are estimated to occupy about 80 hectares (200 acres). The majority of the known populations occur on lands managed by BLM.

Prior to 1999, approximately 5,000 individuals of the Winkler cactus were documented (USFWS 1995a). Due to a general lack of knowledge on this species, approximating the current population status relative to when it was listed is not possible. Monitoring sites have been established in known Winkler cactus populations at Notom and Askland.

Environmental Baseline

Status of the Species within the Action Area

Within the PFO, the Winkler pincushion cactus is associated with low-elevation lands where Dakota and Brushy Basin geologic formations occur. Only one population of this cactus is present in the planning area, located in the west-central and southwest corner of the PFO. The majority of this species is found in the Richfield FO.

Factors Affecting Species Environment within the Action Area

The Winkler cactus is considered a vulnerable plant species due to low numbers of individuals, the scattered and isolated nature of their occurrence, and their restriction to a limited geographic area due to the specificity of their soil and geologic habitat requirements (USDA et al. 1998).

These characteristics make the species vulnerable to human-caused disturbances and exacerbate the effects of natural disturbances on the species. The species may also be vulnerable to a loss of genetic viability due to the small size and isolation of most populations (USFWS 1995a).

Potential human threats to the Winkler cactus populations and suitable habitat include: livestock grazing; recreation, including off-highway vehicle (OHV) use; energy and mineral development, including associated auxiliary disturbances; infrastructure development; paleontological operations; and illegal collection. Illegal collection poses the largest threat to species survival and recovery. Winkler cactus populations near Notom are particularly at risk for collection and vandalism, due to ease of accessibility and the high concentration of the recreating public in that location. As a result, collection has impacted that population and remains a continuing threat (USFWS 1998, England 1997, USDA et al. 1998). The Hartnet population has also been impacted by unauthorized collection, including cacti removed from a grazing exclosure constructed for a monitoring project (USDA et al. 1998).

The habitats of this species are also susceptible to invasion by aggressive native shrubs and non-native weeds when the surface area is disturbed by grazing, OHVs, road building, and other surface-disturbing activities. The potential for human related threats to the species from BLM-authorized activities is recognized by the BLM, and will be considered during future project specific consultations, and appropriate measures will be taken to avoid adverse effects to the species where possible.

Populations of the cacti are also vulnerable to predation by insect larvae (USFWS 1987 and 1998). Natural threats, including insect predation, illegal collection and other illegal or malicious activities, cannot be evaluated in the same manner as BLM-authorized activities in this Biological Opinion because these are not BLM-authorized actions.

Effects of the Action

Cultural Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program may increase minor surface disturbance for cultural resource excavations. Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools in suitable Winkler cactus habitats. These activities may cause: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Paleontological Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities occurring under this program may increase minor surface disturbance for fossil resource excavations. Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools in suitable Winkler cactus habitats. These activities may cause: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Fire and Fuels Management

Major activities associated with the fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Although the BLM does not propose to carry out prescribed fire or non-fire treatments (mechanical and chemical) within suitable habitat for the Winkler cactus, wildland fire suppression activities could adversely affect the Winkler cactus. Activities under this program may increase foot or motorized traffic and application of chemicals (fire retardants, pesticides, insecticides) in suitable Winkler cactus habitats. Associated impacts include: trampling or crushing of individuals; increased soil disturbance; compaction or erosion; removal or degradation of suitable habitat; reduction of the seed bank; reduced pollinator populations; and increase the occurrence of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Forestry and Woodland Management

Forest management objectives are to maintain and enhance the health, productivity, sustainability, and biological diversity of forest and woodland ecosystems and to provide a balance of natural resource benefits and uses, including opportunities for commercial and non-commercial harvest of forest and woodland products on a sustainable basis. Forests are managed for multiple uses, such as recreation, livestock grazing, and wildlife habitat. The forest management program also implements silviculture practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest.

Forest resources support activities such as road construction that may occur in or near existing or suitable Winkler cactus habitat. However, the impacts of these activities are analyzed and authorized by the lands and realty program.

Although activities authorized under this program are not likely to occur in Winkler cactus habitat, there is some potential for private individuals to trample Winkler cactus individuals while harvesting wood products. Known populations of Winkler cactus, and potential habitats, have not been specifically protected from fuel wood, Christmas tree, and post and pole harvesting. As a result, there may be decreased seed production; decreased recruitment; increased illegal collection of individuals due to increased human access; and increased occurrence of plant damage or individual mortality.

Geology and Minerals Resources

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may increase foot traffic, motorized traffic, significant soil disturbance; soil erosion and compaction, and surface development in Winkler cactus habitat. These activities may cause trampling or crushing of individuals, removal of suitable habitat, loss, modification or degradation of suitable habitat, reduced seed banks, reduced pollinator populations, increases the occurrence of invasive plant species, and increased loss of individuals to illegal collection. As a result, there may be loss or degradation of cactus populations; decreases in Winkler cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Hazardous Materials Management

Activities conducted under the hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Activities occurring under this program may increase foot traffic, motorized traffic, and significant soil disturbance in Winkler cactus suitable habitat. These activities may cause trampling or crushing of individuals, removal of suitable habitat, increased soil disturbance; soil erosion and compaction, loss, modification or degradation of suitable habitat, reduced seed banks, reduced pollinator populations, and increased invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in Winkler cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Lands and Realty

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way. Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities authorized under this program may adversely impact Winkler cactus with human- and equipment-related soil disturbances. Soil disturbance will impact individual plants, increased soil disturbance; soil erosion and compaction, modify or degrade suitable habitat, and reduce the seed bank. Land exchanges or sales may increase fragmentation or degradation of suitable Winkler cactus habitat. As a result, there may be loss or degradation of cactus populations; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Livestock Grazing

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire and Fuels Management, or vegetative treatments – see Vegetation Management). Other range improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder other species within the habitat: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase and concentrate domestic ungulate presence, increase motorized traffic, and cause surface disturbance from fence and livestock pond construction in Winkler cactus suitable habitat. These activities may increase the occurrence of trampling, uprooting or crushing of individuals; increase soil disturbance; increase soil erosion and compaction; increase occurrence of exotic plant species; reduce pollinator populations; and modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about BLM's recreational resources, and assessing effects of recreational use on the natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Activities occurring under this program may increase human, horse, and motorized traffic in Winkler cactus suitable habitat. These may cause trampling or crushing of individuals, collection of individuals, increased soil disturbance; soil erosion and compaction; loss, modification or degradation of suitable habitat, reduced seed banks, and increased occurrences of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in Winkler cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Activities occurring under this program occurring may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Winkler cactus habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in Winkler cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Vegetation Management

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Management activities occurring under this program may increase foot traffic, motorized presence, and vegetation treatments in Winkler cactus suitable habitat. These activities may

cause trampling or crushing of individuals, increased soil disturbance; soil erosion and compaction; effects from herbicides, loss, modification or degradation of suitable habitat, seed bank impacts and reductions, reduced pollinator populations, and increased invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in Winkler cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

Management activities occurring under this program may increase foot traffic, motorized presence, and vegetation treatments in Winkler cactus suitable habitat. These activities may cause trampling or crushing of individuals, increased soil disturbance; soil erosion and compaction; effects from herbicides, loss, modification or degradation of suitable habitat, seed bank impacts and reductions, reduced pollinator populations, and increased invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in Winkler cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Fish and Wildlife Resource Management

This program aims to maintain biological diversity, support UDWR Herd Management Plans, improve habitat on for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase foot traffic, motorized traffic, and/or significant soil disturbance in Winkler cactus suitable habitat. These activities may cause trampling or crushing of individuals, removal of suitable habitat, loss, modification or degradation of suitable habitat, reduced seed banks, reduced pollinator populations, and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Transportation and Access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Activities occurring under this program occurring may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Winkler cactus habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy

concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in Winkler cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to the Winkler cactus under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' critical, suitable, or potential habitat;
- Encroachment of human development into a species' critical, suitable, or potential habitat; and
- Management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah;
    - County Governments in Utah;
    - Local Governments in Utah; and
    - Private landholders in Utah.

Winkler cacti occur primarily within BLM management boundaries. In these areas, Winkler cactus locations are surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Winkler cacti are susceptible to activities on State and private lands. Many of these activities, such as livestock grazing, oil and gas exploration and development, human population expansion and associated infrastructure (increased trails and roads), research, and recreation activities (e.g. off-road vehicles), are expected to continue on State and private lands within the Winkler cactus' range. In addition, illegal collection is reasonably certain to occur. Contributing as cumulative effects to the proposed action, all these activities will continue to affect Winkler cactus populations by decreasing abundance, injuring plants, adversely affecting pollinators, and further adversely impacting occupied and suitable habitat.

Conclusions

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including the resource protection measures that were incorporated into the project design.

After reviewing the current status of the Winkler cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the USFWS's biological opinion that the Price Field Office Resource Management Plan, as proposed, is not likely to jeopardize the continued existence of the Winkler cactus. Critical habitat has not been designated for this species. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the BLM Resource Management Plan. If project design cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated.
2. All site-specific projects designed under the proposed BLM Resource Management Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

Uinta Basin hookless cactus *(Sclerocactus glaucus)*

Status of the Species

Species Description

Uinta Basin hookless cactus (*S. glaucus*) is a member of the small cactus genus *Sclerocactus*. Specimens of this species from the Grand Valley of Colorado were initially described as *Echinocactus glaucus* in 1898 by Karl Schumann. Several other specimens of this species, all from Colorado's Grand Valley were subsequently described in the scientific literature: *Echinocactus subglaucus* (Rydberg in 1917), *Sclerocactus whipplei* var. *glaucus* (Purpus 1925) and *Sclerocactus franklinii* (Evans 1939). The Uinta basin hookless cactus was listed as threatened under the Endangered Species Act of 1973, as amended (ESA), on October 11, 1979 (USFWS 1979).

In the 1930's Edward Graham collected "*Sclerocactus whipplei*" and "*Utahia sileri*" specimens in Utah's Uinta Basin. These along with the Colorado plants were included by Lyman Benson in his 1966 monograph on the genus *Sclerocactus,* as *Sclerocactus glaucus*. The USFWS followed this taxonomic treatment when the Uinta Basin hookless cactus (*S. glaucus*) was listed as a threatened species in 1979 (USFWS 1979).

Taxonomic changes continued after *Sclerocactus glaucus*' listing in 1979. Of importance is Fritz Hochstätter's description and publication of *Sclerocactus wetlandicus* in1989. He describes this species as occurring in northeast Utah in habitat around the Pariette Wetlands. In 1993, he recognized a variety, which he named *ilseae*. He describes this variety as maintaining a relatively small form with extremely short spination. Also recognizing a distinctive entity in the Pariette Draw, Kenneth D. Heil and J. Mark Porter published *Sclerocactus brevispinus* in 1994. *S. brevispinus* is distinctive, due largely to its globose stems, short spines, and small flowers.

S. wetlandicus and *S. brevispinus* comprise distinct morphological forms of *S. glaucus*. Genetics research is ongoing (Hochstätter 1989, 1993 cited in Heil and Porter 2004; Porter et al. 2006). The USFWS recognizes these two species as threatened under *S. glaucus*'s original

listing as threatened, and have proposed a revision to recognize *S. wetlandicus* and *S. brevispinus* as threatened under their now recognized scientific names (72 FR 53211 September 18, 2007).

Sclerocactus wetlandicus (The Utah form of typical *S. glaucus*) is a photosynthesizing green plant with succulent unbranched stems usually 3 to 9 cm diameter and 4 to 12 cm tall varying from spheric to elongated cylindrical in shape. The succulent stem has 12 to 14 ribs spirally aligned on the plant body with tubercles bearing spines. Spines are borne in clusters on areoles at the apex of the rib tubercles. The spines are of three types: 6 to 10 strait radial spines 6 to 20 mm long are borne at the margin of areole, 3 to 4 central strait spines similar to radial spines but borne in central portion of the areole around the, usually large single (sometimes 2 or lacking) abaxial spine 15 to 29 mm long and thicker than the other spines the abaxial spine is strait or gently curved (very rarely hooked). (Hooked abaxial spines are the norm in all Sclerocactus species except *S. glaucus* and *S. wetlandicus*). Flowers are funnelform 2 to 4 centimeters wide and 2.5 to 5 centimeters high. The sepals and petals are collectively called tepals in cacti. The outer tepals are oblanceolate about 15 mm wide and 20 to 50 mm long with broad brownish lavender midstripe and pink to violet margins. The inner tepals are oblanceolate to lanceolate 17 to 25 mm wide and 30 to 60 mm long pink or violet. The stigma has 6 lobes and it and the style is pinkish yellow. Filaments are green to white and anthers are yellow. The Fruit is ovoid to barrel shaped reddish or reddish grey when ripe 7 to 12 millimeters wide and 9 to 25 mm long. Seeds are black 1.5 millimeters wide 2.5 millimeters long (Hochstätter 1993, cited in Heil and Porter 1994).

Sclerocactus brevispinus (The short spined form Utah form of *S. glaucus*) is a photosynthesizing green plant with succulent unbranched stems usually 1.8 to 7 cm diameter and 2.5 to 8 centimeters tall varying from depressed spheric to shortened cylindrical in shape. The succulent stem has about 13 ribs spirally aligned on the plant body with tubercles bearing spines. Spines are borne in clusters on areoles at the apex of the rib tubercles. The spines are of three types: 6 to 7 strait radial spines 5 to 15 mm long are borne at the margin of areole, 0 to 2 lateral strait central spines similar to radial spines but borne in central portion of the areole around the usually small single (sometimes lacking) abaxial spine 1 to 5 mm long and thicker than the other spines the abaxial spine is hooked (in specimens with 1 to 2 mm central long spines the spine hook reflexes back to the surface of the areole) are shorter. Flowers are campanulate about 1.1 to 3 centimeters wide and 2 to 3 centimeters high. The outer tepals are oblanceolate about 6 millimeters wide and 15 millimeters long with broad brownish midstripe and pink to purple margins. The inner tepals are oblanceolate to lanceolate 10 to 22 millimeters wide and 30 to 60 millimeters long purple. The stigma has 6 lobes and it and the style is pinkish yellow. Filaments are white to green to pinkish purple and anthers are yellow. The Fruit is shortened barrel shaped reddish or reddish grey when ripe 7 to 12 mm wide and 9 to 25 mm long. Seeds are black 1.8 to 2.7 millimeters wide 2.5 to 3.8 millimeters long. (Species descriptions adapted from Hochstätter 1993).

Life History and Population Dynamics

The Uinta Basin hookless cactus is a slow-growing species (Rechel et al. 1999). Reproduction is sexual. Flowering occurs from April to May and fruiting occurs from May to June. Bees, flies, beetles, and ants have been observed visiting Uinta basin hookless cactus flowers, however, the effective pollination vectors are not clearly understood (USFWS 1990). Seed dispersal is

possibly a limiting factor in the distribution of the species. Seed dispersal is accomplished primarily by ants (Rechel et. al. 1999), but may also occur via rain and water flow, other insects, birds, and rodents (USFWS 1990). Seed dispersal is possibly a limiting factor in the distribution of the species. Factors which govern the distribution of Uinta Basin hookless cactus and long-term population dynamics are poorly understand (USFWS 1990).

Status and Distribution

Populations and suitable habitat for the Uinta Basin hookless cactus occur within the administrative boundaries of BLM's Vernal Field Office and Price Field Office. The cactus is found in the Uinta Basin of northeastern Utah and the upper Colorado and Gunnison River valleys of western Colorado. In Colorado, there are two population centers of Uinta Basin hookless cactus which occur in the Upper Colorado and Gunnison River valleys of western Colorado. These population centers occur on alluvial river terraces of the Gunnison River from near Delta, Colorado, to southern Mesa County, Colorado; and on alluvial river terraces of the Colorado River and in the Plateau and Roan Creek drainages in the vicinity of DeBeque, Colorado (USFWS 1990).

In Utah, the Uinta Basin hookless cactus is found within one major population center composed of three important population groups. Each of these three population groups occur within the BLM Diamond Mountain planning area, with one of the three populations extending into the Book Cliffs planning area and one extending into the Price River planning area. Specifically, the three Utah populations are found within the following areas and habitats:

- on alluvial river terraces near the confluence of the Green, White, and Duchesne rivers including Ouray National Wildlife Refuge and the town of Ouray, Utah, south along the Green River, to the vicinity of Sand Wash including concentrations near the mouth of Pariette Draw;
- along the base of the Badlands Cliffs in extreme southeastern Duchesne County; and
- a small population of a morphologically distinct form (*S. brevispinus*) growing on the Clay badlands in the Pariette Draw drainage south of Myton, Utah, which gradates into the more typical Uinta Basin hookless cactus near the mouth of Pariette Draw south of Ouray, Utah (USFWS 1990).

There are additional populations east along the White River drainage and a disjunct population near Bonanza, Utah.

S. wetlandicus generally occurs on cobblely, gravelly, or rocky surfaces on river terrace deposits and lower mesa slopes. The morphologically distinct form, *S. brevispinus*, occurs on badlands in the Pariette Draw drainage, derived from the Wagonhound member of the Uinta geologic formation.

S. glaucus occurs on varying exposures, but is more abundant on south facing exposures, and on slopes to about 30 percent grade; it is most abundant at the point where terrace deposits break from level tops to steeper side slopes. The species is found at an elevational range of 4,500 to 5,900 feet.

Vegetation type of the species' habitat is comprised of desert scrub dominated by shadscale (*Atriplex confertifolia*), galleta (*Hilaria jamesii*), black-sage (*Artemisia nova*), and Indian rice grass (*Stipa hymenoides*). Other important species include two similar spherical or cylindrical cactus species, strawberry hedgehog cactus (*Echinocereus triglochidiatus* var. *melanacanthus*) and Simpson's pincushion cactus (*Pediocactus simpsonii*). Other important species in the plant community include the prickly pear cactus (*Opuntia polycantha*), winterfat (*Krascneninnikovia lanata*), yucca (*Yucca harrimaniae*), snakeweed (*Gutierrezia sarothrae*), low rabbitbrush (*Crysothamnus viscidiflorus*), sand dropseed (*Sporobolus cryptandrus*), and Salina wildrye (*Elymus salinus*) (USFWS 1990).

Environmental Baseline

Status of the Species within the Action Area

According to the Biological Assessment, approximately 759,724 acres of potentially suitable habitat exists within the Vernal and Price Field Offices. However, the majority of this habitat is in the Vernal Field Office. Within the PFO, the Uinta Basin hookless cactus is associated with low-elevation lands where outcroppings of the Green River and Mancos geologic formations occur. Typical habitat is located on the coarse soils above the flood plain of the Green River. This occurrence generally is associated with the northeast corner of the PFO. No range-wide study of this species has been completed, so it is unknown how much of the cactus is in this planning area.

Factors Affecting Species Environment within the Action Area

Range-wide activities with the greatest potential to adversely affect Uinta basin hookless cactus populations and habitats include: livestock grazing (trampling); off-highway vehicle use; energy and mineral exploration and development; stone collecting; the use of insecticides and herbicides; and illegal collection (USFWS 1990). In addition to these human-induced threats, several natural threats to the continued conservation of the species include: disease, parasitism, predation, drought, erosion, trampling by wildlife, and vegetative competition (USFWS 1990).

Effects of the Action

Cultural Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program include minor surface disturbance for cultural resource excavations. Activities under this program may increase localized foot traffic, motorized traffic, and use of tools in Uinta basin hookless cactus habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Paleontological Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program include minor surface disturbance for fossil resource excavations. Activities under this program may increase localized foot traffic, motorized traffic, and use of tools in Uinta basin hookless cactus habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Fire and Fuels Management

Major activities associated with the BLM's fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Although the BLM does not propose to carry out prescribed fire or non-fire treatments (mechanical and chemical) within suitable habitat for the Uinta basin hookless cactus, wildland fire suppression activities could adversely affect the Uinta Basin hookless cactus. Activities under this program may result in increased foot or motorized traffic and application of chemicals (fire retardants, pesticides, insecticides) in suitable Uinta basin hookless cactus habitats. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Forestry and Woodlands Resources

The forest management program implements silvicultural practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest. The program allows the treatment of forest insect and disease infestations by spraying, cutting, and removal; and herbicidal spraying of grasses and shrubs. Forest management actions may also include conducting surveys, obtaining easements, pursuing legal access, allowing road development, and installing drain culverts and water bars. Wood and seed collection as well as non-commercial harvest of posts and Christmas trees are also authorized under this program.

Although activities authorized under this program are not likely to occur in Uinta Basin hookless cactus habitat, there is some potential for private individuals to trample Uinta Basin hookless cactus individuals while harvesting wood products. Known populations of Uinta Basin hookless

cactus, and potential habitats have not been specifically protected from fuel wood, Christmas tree, and post and pole harvesting. As a result, there may be decreased seed production; decreased recruitment; increased illegal collection of individuals due to increased human access; and increased occurrence of plant damage or individual mortality.

Geology and Minerals Management

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may result in increased foot traffic and motorized traffic, significant soil disturbance; increased energy development of facilities, and increased mineral excavation in Uinta basin hookless cactus habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; loss, modification, or degradation of suitable habitat; reduced seed banks; loss of pollinator populations; increased occurrences of invasive plant species; and increased occurrence of illegal collection due to increased human access due to increased human access. As a result, there may be loss or degradation of cactus populations; decreased Uinta Basin hookless cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Hazardous Materials Management

Activities conducted under the BLM's hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Activities occurring under this program may increase foot traffic, motorized traffic, and significant soil disturbance in Uinta Basin hookless cactus suitable habitat. These activities may cause trampling or crushing of individuals, removal of suitable habitat, increased soil disturbance; soil erosion and compaction, loss, modification or degradation of suitable habitat, reduced seed banks, reduced pollinator populations, and increased invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in Uinta Basin hookless cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Lands and Realty

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights of way access to serve administrative and

public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way. Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities authorized under this program may adversely impact Uinta Basin hookless cactus with human- and equipment-related soil disturbances. Soil disturbance, erosion, and compaction may impact individual plants, modify or degrade suitable habitat, reduce pollinator populations, and reduce the seed bank. Land exchanges may result in fragmentation or degradation of potential Uinta Basin hookless cactus habitat. As a result, there may be loss or degradation of cactus populations; decreased recruitment; and increased occurrence of plant damage and individual mortality.

Livestock Grazing

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire Management, or vegetative treatments – see Vegetation Management). Other range improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder other species within the habitat: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase and concentrate domestic ungulate presence; increase motorized traffic; and surface disturbance from fence and livestock pond construction in Uinta basin hookless cactus suitable habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about BLM's recreational resources, and assessing effects of recreational use on the

natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Activities occurring under this program may increase human, horse, and motorized traffic in Uinta basin hookless cactus suitable habitat. Associated impacts from these activities include trampling or crushing of individuals, illegal collection of individuals due to increased human access, loss, modification or degradation to suitable habitat, reduced seed banks, and increased occurrences of invasive plant species. As a result, there may be decreased recruitment, and increased occurrence of plant damage or individual mortality.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Uinta Basin hookless cactus habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment and increased plant damage or individual mortality.

Vegetation Management

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Management activities occurring under this program may increase foot traffic, motorized presence, and vegetation treatments in Uinta basin hookless cactus suitable habitat. Associated impacts include trampling or crushing of individuals, loss, modification or degradation of suitable habitat, reductions in seed banks, reduced pollinator populations, and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

Activities occurring under this program may increase foot traffic and motorized traffic related to herd gathering and holding pen construction activities in Uinta basin hookless cactus suitable habitat. Herd gathering intentionally concentrates horses, further disturbing habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Wildlife and Fisheries Management

This program aims to maintain biological diversity, support UDWR Herd Management Plans, improve habitat on for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase foot traffic, motorized traffic, and/or significant soil disturbance in Uinta Basin hookless cactus suitable habitat. These activities may cause trampling or crushing of individuals, increased soil disturbance, erosion, and compaction; removal of suitable habitat; loss, modification or degradation of suitable habitat; reduced seed banks; reduced pollinator populations; and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Transportation and Access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Activities occurring under this program occurring may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Uinta Basin hookless cactus habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of cactus populations; decreases in Uinta Basin hookless cactus seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to the Uinta Basin hookless cactus under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' suitable or potential habitat;
- Encroachment of human development into a species' critical, suitable, or potential habitat; and
- Management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah;
    - County Governments in Utah;
    - Local Governments in Utah; and
    - Private landholders in Utah.

Uinta Basin hookless cacti occur primarily within BLM management boundaries. In these areas, Uinta Basin hookless cactus locations are surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Uinta Basin hookless cacti are susceptible to activities on State and private lands. Many of these activities, such as livestock grazing, oil and gas exploration and development, research, human population expansion and associated infrastructure (increased trails and roads), and recreation activities (e.g. off-road vehicles), are expected to continue on State and private lands within the Uinta Basin hookless cactus' range. In addition, illegal collection is reasonably certain to occur. Contributing as cumulative effects to the proposed action, all these activities will continue to affect Uinta Basin hookless cactus populations by decreasing abundance, injuring plants, adversely affecting pollinators, and further adversely impacting occupied and suitable habitat.

Conclusions

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including the conservation measures that were incorporated into the project design.

After reviewing the current status of the Uinta Basin hookless cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the USFWS's biological opinion that the Proposed VFO Resource Management Plan, as proposed, is not likely to jeopardize the continued existence of the Uinta Basin hookless cactus. Critical habitat has not been designated for this species. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the Resource Management Plan. If project design

cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated.

2. All site-specific projects designed under the proposed Resource Management Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

Barneby reed-mustard (*Schoenocrambe barnebyi*)

Status of the Species

Species Description

Barneby reed-mustard (*Schoenocrambe barnebyi*) is endemic to soils derived from specific geologic substrates in the lower elevations of the Fremont River and Muddy Creek drainages in central Utah. James Harris first discovered the Barneby reed-mustard in 1980 on a site located in the southern portion of the San Rafael Swell in Emery County, Utah. On January 14, 1992, the Barneby reed-mustard was listed as endangered under the Endangered Species Act of 1973, as amended (ESA), due to threats posed by uranium development and trampling by park visitors (57 FR 1398 1403).

Barneby reed-mustard is a perennial herbaceous plan with sparsely leaved stems 22 to 35 cm (9 to 15 inches) tall arising from a woody root crown. The leaves are entire with a smooth margin, 1.5 to 5 cm (0.6 to 3 inches) long and 0.5 to 2.5 cm (0.2 to 1 inch) wide. The leaf blades are alternately arranged on the stem and are attached to the stem by a petiole. The flowers have petals that are light purple with prominent darker purple veins and measure about 12 mm (0.4 inch) long and 2.5 mm. (0.1 inch) wide. The entire flowers are about 1 cm (0.4) across in full anthesis and are displayed in a raceme of, commonly, 2 to 8 flowers at the end of the plant's leafy stems.

Life History and Population Dynamics

Barneby reed-mustard flowers are purple-veined, white or lilac colored, appearing from late April to early June (Franklin 1993, USFWS 1994). Barneby reed-mustard reproduces sexually. Specific information on pollination mechanisms and vectors for the species is limited (USFWS 1994).

Status and Distribution

Barneby reed-mustard grows in xeric, fine textured soils on steep eroding slopes of the Moenkopi and Chinle formations, at elevations ranging from 4,790 - 6,512 feet (1,460 to 1,985 meters). The species occurs in sparsely vegetated sites within the mixed desert shrub vegetation communities with occasional Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*). Shrub species commonly associated with Barneby reed-mustard include Utah serviceberry (*Amelanchier utahensis*), Tarragon sagebrush (*Artemisia dracunculus*), shadscale saltbush (*Atriplex confertifolia*), and rubber rabbitbrush (*Chrysothamnus nauseosus*) (Franklin 1993, USFWS 1994).

Barneby reed-mustard is endemic to the Colorado Plateau in Emery and Wayne counties, Utah. Two recorded populations of Barneby reed-mustard are currently known in Utah (UNHP 2003). The northern-most central population of the species, consisting of approximately three sub-populations, occurs in southwestern Emery County on BLM lands in the San Rafael planning area of the Price FO (UNHP 2003). The population specifically occurs on high elevation, steep, north-facing slopes in heavily shaded areas. Suitable habitat also occurs north of the known population, but the BLM has not yet completed comprehensive inventories for the species in this area. The second population of Barneby reed-mustard, consisting of two sub-populations, falls within Capitol Reef National Park, in the southwestern corner of Wayne County (UNHP 2003). The Capitol Reef National Park population occurs on steep slopes in a remote area along Sulphur Creek, a tributary of the Fremont River. Suitable habitat also occurs in the surrounding portions of the National Park, and as previously mentioned, on a small parcel of BLM land adjacent to Capitol Reef National Park. All suitable, potential habitats within Capitol Reef National Park have been inventoried, and to date, no additional Barneby reed-mustard populations have been documented.

Environmental Baseline

Status of the Species within the Action Area

The Barneby reed-mustard is narrowly distributed and has extremely low population numbers. This species requires more survey work to determine its population levels and trends.

Factors Affecting Species Environment within the Action Area

Due to Barneby reed-mustard's limited distribution and low numbers, it was listed as endangered because it was susceptible to any impacts. Therefore, any energy and mineral development, in particular, oil and gas exploration and production; oil-shale mining and processing; building stone removal; and OHV recreation in Barneby reed-mustard habitat may lead to extirpation.

Effects of the Action

Cultural Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program include minor surface disturbance for cultural resource excavations. Activities under this program may increase localized foot traffic, motorized traffic, and use of tools in Barneby reed-mustard habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Paleontological Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program include minor surface disturbance for fossil resource excavations. Activities under this program may increase localized foot traffic, motorized traffic, and use of tools in Barneby reed-mustard habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Fire and Fuels Management

Major activities associated with the BLM's fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Although the BLM does not propose to carry out prescribed fire or non-fire treatments (mechanical and chemical) within suitable habitat for the Barneby reed-mustard, wildland fire suppression activities could adversely affect the Barneby reed-mustard. Activities under this program may result in increased foot or motorized traffic and application of chemicals (fire retardants, pesticides, insecticides) in suitable Barneby reed-mustard habitats. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Forestry and Woodlands Resources

The forest management program implements silvicultural practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest. The program allows the treatment of forest insect and disease infestations by spraying, cutting, and removal; and herbicidal spraying of grasses and shrubs. Forest management actions may also include conducting surveys, obtaining easements, pursuing legal access, allowing road development, and installing drain culverts and water bars. Wood and seed collection as well as non-commercial harvest of posts and Christmas trees are also authorized under this program.

Although activities authorized under this program are not likely to occur in Barneby reed-mustard habitat, there is some potential for private individuals to trample Barneby reed-mustard individuals while harvesting wood products. Known populations of Barneby reed-mustard, and

potential habitats have not been specifically protected from fuel wood, Christmas tree, and post and pole harvesting. As a result, there may be decreased seed production; decreased recruitment; increased illegal collection of individuals due to increased human access; and increased occurrence of plant damage or individual mortality.

Geology and Minerals Management

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may result in increased foot traffic and motorized traffic, significant soil disturbance; increased energy development of facilities, and increased mineral excavation in Barneby reed-mustard habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; loss, modification, or degradation of suitable habitat; reduced seed banks; loss of pollinator populations; increased occurrences of invasive plant species; and increased occurrence of illegal collection due to increased human access. As a result, there may be loss or degradation of plant populations and habitat; decreased Barneby reed-mustard seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Hazardous Materials Management

Activities conducted under the BLM's hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Activities occurring under this program may increase foot traffic, motorized traffic, and significant soil disturbance in Barneby reed-mustard suitable habitat. Associated impacts include: trampling or crushing of individuals, removal of suitable habitat, modification or degradation to suitable habitat, seed bank reductions, loss of pollinators, and increased occurrences of invasive plant species. As a result, there may be loss or degradation of plant populations and habitat; decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Lands and Realty

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way.

Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities authorized under this program may adversely impact Barneby reed-mustard with human- and equipment-related soil disturbances. Soil disturbance, erosion, and compaction may impact individual plants, modify or degrade suitable habitat, reduce pollinator populations, and reduce the seed bank. Land exchanges may result in fragmentation or degradation of suitable Barneby reed-mustard habitat. As a result, there may be loss or degradation of plant populations and habitat; decreased recruitment; and increased occurrence of plant damage and individual mortality.

Livestock Grazing

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire Management, or vegetative treatments – see Vegetation Management). Other range improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder other species within the habitat: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase and concentrate domestic ungulate presence; increase motorized traffic; and increase surface disturbance from fence and livestock pond construction in Barneby reed-mustard suitable habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be decreased recruitment; increased occurrence of plant damage or individual mortality, and loss or degradation of habitat.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about BLM's recreational resources, and assessing effects of recreational use on the natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Activities occurring under this program may increase human, horse, and motorized traffic in Barneby reed-mustard suitable habitat. Associated impacts from these activities include trampling or crushing of individuals, illegal collection of individuals due to increased human access, loss, modification or degradation to suitable habitat, reduced seed banks, and increased occurrences of invasive plant species. As a result, there may be decreased recruitment; increased occurrence of plant damage or individual mortality; and loss or degradation of habitat.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Barneby reed-mustard habitats. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment and increased plant damage or individual mortality.

Vegetation Management

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Management activities occurring under this program may increase foot traffic, motorized presence, and vegetation treatments in Barneby reed-mustard suitable habitat. Associated impacts include trampling or crushing of individuals, loss, modification or degradation of suitable habitat, reductions in seed banks, reduced pollinator populations, and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

Activities occurring under this program may increase foot traffic and motorized traffic related to herd gathering and holding pen construction activities in Uinta basin hookless plant suitable habitat. Herd gathering intentionally concentrates horses, further disturbing habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Wildlife and Fisheries Management

This program aims to maintain biological diversity, support UDWR Herd Management Plans, improve habitat on for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase foot traffic and motorized traffic related to herd gathering and holding pen construction activities in Barneby reed-mustard suitable habitat. Herd gathering intentionally concentrates horses, further disturbing habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Transportation and Access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Barneby reed mustard habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of plant populations and habitat; decreases in production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to the Barneby reed-mustard under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' critical, suitable, or potential habitat.
- Encroachment of human development into a species' critical, suitable, or potential habitat.
- Program management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah
    - County Governments in Utah
    - Local Governments in Utah
    - Private landholders in Utah

The Barneby reed-mustard occur primarily within BLM management boundaries. In these areas, the Barneby reed-mustard locations are surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Utah reed-mustards are susceptible to activities on State and private lands. Many of these activities, such as livestock grazing, oil and gas exploration and development, increased road densities, research, and recreation activities (e.g. off-road vehicles and stone collecting), are expected to continue on State and private lands within the Barneby reed-mustard ranges. Contributing as cumulative effects to the proposed action, all these activities will continue to affect Barneby reed-mustard populations by increasing mortalities, injuring plants, and further adversely impacting limited occupied and suitable habitat.

Conclusions

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including the resource protection measures that were incorporated into the project design.

After reviewing the current status of the Barneby reed-mustard, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the USFWS's biological opinion that the Price Field Office's Resource Management Plan, as proposed, is not likely to jeopardize the continued existence of the Barneby reed-mustard. Critical habitat has not been designated for this species. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the BLM Land Use Plan. If project design cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated.

2. All site-specific projects designed under the proposed BLM Land Use Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

Jones cycladenia (*Cycladenia humilis*)

Status of the Species

Species Description

Jones cycladenia (*C. humilis* var. *jonesii*) is in the dogbane family, and is endemic to the Colorado Plateau in Utah and Arizona. This species was first discovered in 1914 by Marcus E. Jones and named after Jones in 1942. Jones cycladenia was listed as threatened under the Endangered Species Act (ESA) May 5, 1986. No critical habitat was designated.

Jones cycladenia is "Perennial caulescent herb 11-36 cm tall glabrous and glaucous, the lower most leaves reduced to subamplexicaul bracts, enlarging and becoming green upwards; main foliage leaves 3.5-9.5 cm long, 2-6.5 cm wide, oval to orbicular or broadly obovate, tapering abruptly to the broad petiole, thickened, entire, the apex rounded to acute; pedicels 5-25 mm long; bracts linear-lanceolate, 3-9 mm long; calyx lobes 5-11 mm long, lance linear, villous pilose, somewhat accrescent in fruit; corolla rose purple, dimorphic, either broadly lobed, or 18-21 mm long, and 13-19 mm wide, rose pink, more or less pilose, follicles 4.5-9.5 cm long; seeds brown , ca 7.5 mm long, the coma ca. 20 mm long. Flowers dimorphic, obligate on gypsophile of semi-barren tracts on geological formations with poor water" (Welsh and Atwood 1975).

Life History and Population Dynamics

Jones cycladenia is a long-lived perennial. Depending on the location, flowering and fruiting occurs from mid-May through June. Jones cycladenia has various methods of reproduction that include self-pollination, cross pollination and the production of clones through rhizomes. Jones cycladenia requires a pollen vector for reproduction. A variety of flies, wasps and short tongued bees or butterflies pollinate the threatened species. However, no single pollinator or group of pollinators has been observed consistently pollinating the species (Sipes et. al 1994). In 1992, enzyme electrophoresis research determined that clones do not extend more than 10 meters in any direction. Heterozygosity was low which suggested inbreeding or population sub-structuring. Genetic variation was great between separated populations (Sipes et. al 1992).

Status and Distribution

Jones cycladenia occurs within desert shrub and scattered pinyon/juniper and wild buckwheat - Mormon tea communities at elevations ranging between 1340 to 1830 meters (4,400 to 6,000 feet). Jones cycladenia is known to exist in shallow soils developed from shale originating from the Summerville, Cutler, and Chinle formations of the Colorado Plateau (Sipes and Boettinger 1997). Populations are found on all aspects and on slopes that range from moderate to steep.

Jones cycladenia has been found in four isolated areas in Utah's Emery, Garfield, and Grand Counties and Arizona's Coconino County. The population in Arizona is a historical population. Twenty six total sites of Jones cycladenia have been located. A "site" is a uniquely named occurrence, distinct from other named occurrences by distance or landscape structure, such as elevation, slope position, or characteristics of intervening habitat. Two sites occur on lands administered by the Bureau of Land Management Moab field office. Two sites are located on land administered by the Price field office. Other sites occur on land managed by the National

Park Service (on Grand Staircase-Escalante National Monument, Capital Reef National Park and Glen Canyon National Recreation Area); Native American tribes, Utah State lands, and the Arizona Strip office of the BLM.

The total population of Jones cycladenia is currently unknown. Since many of the mature stems are clones of the same plant connected by underground rhizomes, the actual number of plants is hard to determine. At the time of listing, known Jones cycladenia populations were estimated to contain 7,500 individuals. This estimate is now presumed high. Accurate population estimates for Jones cycladenia are complicated by the species' clonal life history. We now estimate the species has 25,000 ramets (or above-ground stems), but that these stems represent approximately 1,100 ganets (or individuals). This estimate is based on a 1995 range-wide estimate of ramets (Sipes and Tepedino 1995) and genetic results which indicate there 22.1 ramets per genet (Sipes et al. 1994). The recovery plan and future ESA consultation should address the fact that observed numbers of ramets represent a substantially smaller set of unique individuals.

Environmental Baseline

Status of the Species within the Action Area

Out of 26 total known sites where Jones cycladenia exists, two are present in the action area, in Emery county. The majority of this species is located on National Park Service Land in other parts of Utah.

Factors Affecting Species Environment within the Action Area

Studies have suggested that the genetic variation within sites is small. This is a result of self pollination and cloning due to a lack of pollinating vectors (Sipes and Tepedino 1996). The milkweed bug *Lygaeus kalmii* (Hemiptera) has been observed causing extensive damage to Jones cycladenia plants. However, it has been suggested that population flux of the insect may determine the extent of the damage (Sipes et. al 1994). In addition, based on the type of areas Jones cycladenia is found, there is a possibility of OHV recreational use and threat to the species. Grazing, woodland management and other recreation activities may also impact this species.

Effects of the Action

Cultural Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program include minor surface disturbance for cultural resource excavations. Activities under this program may increase localized foot traffic, motorized traffic, and use of tools in Jones cycladenia habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations and increased occurrence of invasive plant

species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Paleontological Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program include minor surface disturbance for fossil resource excavations. Activities under this program may increase localized foot traffic, motorized traffic, and use of tools in Jones cycladenia habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Fire and Fuels Management

Major activities associated with the BLM's fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Although the BLM does not propose to carry out prescribed fire or non-fire treatments (mechanical and chemical) within suitable habitat for the Jones cycladenia, wildland fire suppression activities could adversely affect the Jones cycladenia. Activities under this program may result in increased foot or motorized traffic and application of chemicals (fire retardants, pesticides, insecticides) in suitable Jones cycladenia habitats. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Forestry and Woodlands Resources

The forest management program implements silvicultural practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest. The program allows the treatment of forest insect and disease infestations by spraying, cutting, and removal; and herbicidal spraying of grasses and shrubs. Forest management actions may also include conducting surveys, obtaining easements, pursuing legal access, allowing road development, and installing drain culverts and water bars. Wood and seed collection as well as non-commercial harvest of posts and Christmas trees are also authorized under this program.

Although activities authorized under this program are not likely to occur in Jones cycladenia habitat, there is some potential for private individuals to trample Jones cycladenia individuals while harvesting wood products. Known populations of Jones cycladenia, and potential habitats have not been specifically protected from fuel wood, Christmas tree, and post and pole harvesting. As a result, there may be decreased seed production; decreased recruitment; increased illegal collection of individuals due to increased human access; and increased occurrence of plant damage or individual mortality.

Geology and Minerals Management

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may result in increased foot traffic and motorized traffic, significant soil disturbance; increased energy development of facilities, and increased mineral excavation in Jones cycladenia habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; loss, modification, or degradation of suitable habitat; reduced seed banks; loss of pollinator populations; increased occurrences of invasive plant species; and increased occurrence of illegal collection due to increased human access due to increased human access. As a result, there may be loss or degradation of plant populations and habitat; decreased Jones cycladenia seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Hazardous Materials Management

Activities conducted under the BLM's hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Activities occurring under this program may increase foot traffic, motorized traffic, and significant soil disturbance in Jones cycladenia suitable habitat. Associated impacts include: trampling or crushing of individuals, removal of suitable habitat, modification or degradation to suitable habitat, seed bank reductions, loss of pollinators, and increased occurrences of invasive plant species. As a result, there may be loss or degradation of plant populations and habitat; decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Lands and Realty

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations,

sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way. Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities authorized under this program may adversely impact Jones cycladenia with human- and equipment-related soil disturbances. Soil disturbance, erosion, and compaction may impact individual plants, modify or degrade suitable habitat, reduce pollinator populations, and reduce the seed bank. Land exchanges may result in fragmentation or degradation of potential Jones cycladenia habitat. As a result, there may be loss or degradation of plant populations and habitat; decreased recruitment; and increased occurrence of plant damage and individual mortality.

Livestock Grazing

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire Management, or vegetative treatments – see Vegetation Management). Other range improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder other species within the habitat: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase and concentrate domestic ungulate presence; increase motorized traffic; and surface disturbance from fence and livestock pond construction in Jones cycladenia suitable habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about BLM's recreational resources, and assessing effects of recreational use on the

natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Activities occurring under this program may increase human, horse, and motorized traffic in Jones cycladenia suitable habitat. Associated impacts from these activities include trampling or crushing of individuals, illegal collection of individuals due to increased human access, loss, modification or degradation to suitable habitat, reduced seed banks, and increased occurrences of invasive plant species. As a result, there may be decreased recruitment, and increased occurrence of plant damage or individual mortality.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Act Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Jones cycladenia habitats. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment and increased plant damage or individual mortality.

Vegetation Management

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Management activities occurring under this program may increase foot traffic, motorized presence, and vegetation treatments in Jones cycladenia suitable habitat. Associated impacts include trampling or crushing of individuals, loss, modification or degradation of suitable habitat, reductions in seed banks, reduced pollinator populations, and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes

maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

Activities occurring under this program may increase foot traffic and motorized traffic related to herd gathering and holding pen construction activities in Uinta basin hookless plant suitable habitat. Herd gathering intentionally concentrates horses, further disturbing habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Wildlife and Fisheries Management

This program aims to maintain biological diversity, support UDWR Herd Management Plans, improve habitat on for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase foot traffic and motorized traffic related to herd gathering and holding pen construction activities in Jones cycladenia suitable habitat. Herd gathering intentionally concentrates horses, further disturbing habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Transportation and Access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Activities occurring under this program occurring may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Barneby reed mustard habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of plant populations and habitat; decreases in production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future

Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to the Jones cycladenia under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' critical, suitable, or potential habitat.
- Program management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah
    - County Governments in Utah
    - Local Governments in Utah
    - Private landholders in Utah

Jones cycladenia occurs primarily within BLM management boundaries. In these areas, Jones cycladenia locations are surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Jones cycladenia plants are susceptible to activities on State and private lands. Many of these activities, such as uranium mining, recreation activities (e.g. off-road vehicles), and research are expected to continue on State and private lands within the Jones cycladenia's range. Private land concentrated around Moab could be developed for housing or as grazing operations. Oil and gas development will likely continue on private and state lands, as will road building. Contributing as cumulative effects to the proposed action, all these activities will continue to affect Jones cycladenia populations by increasing mortalities, injuring plants, and further adversely impacting occupied and suitable habitat.

Conclusions

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including the resource protection measures that were incorporated into the project design.

After reviewing the current status of the Jones cycladenia, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the USFWS's biological opinion that the Price Field Office's Resource Management Plan, as proposed, is not likely to jeopardize the continued existence of the Jones cycladenia. Critical habitat has not been designated for this species. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the BLM Resource Management Plan. If project design cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated

2. All site-specific projects designed under the proposed BLM Resource Management Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

Maguire daisy (*Erigeron maguirei*)

Status of the Species

Species Description

The Maguire daisy (*Erigeron maguirei*) is endemic to sandstone canyons and mesas in Utah. The species was first collected in 1940 by Dr. Bassett Maguire in the dry, sandy bottom in Calf Creek area in San Rafael Swell, Emery County, Utah. By 1982, only 8 total plants had been counted. *E. maguirei* was listed as endangered under the Endangered Species Act (ESA) of 1973, as amended, on September 5, 1985 (50 FR 36089). In 1996, it was downlisted from endangered to threatened (50 CFR Part 17, Vol. 61, No. 119) after recognition that *Erigeron maguirei* var. *maguirei* and *Erigeron maguirei* var. *harrisonii* are the not separate subspecies. No critical habitat has currently been designated for the species

The Maguire daisy is a perennial, herbaceous plant with decumbent, to sprawling or erect stems that are 7 to 18 centimeters (cm) high. The basal leaves are spatulate or broadly oblanceolate, 2 to 5 cm long and 6 to 9 millimeters (mm) wide. The well-developed stem leaves are sessile or short-petiolate, and are alternately arranged on the stem. The leaves and stem are covered with abundant spreading hairs. One to three flower heads are borne at the end of each stem. The floral disc is 8 to 10 mm high. Each floral head has 15 to 20 white or pinkish-white colored ray flowers that are about 6 to 8 mm long and 1.5 to 2 mm wide. The disk flowers are yellow-orange and about 3.5 to 3.8 mm long. The seeds are 2-nerved achenes.

Life History and Population Dynamics

Reproduction in Maguire daisy is by seed. No asexual reproduction has been observed. Flowering occurs from May to June and fruit set is from June to July. Mid-June is generally the height of flowering. Alston and Tepedino (2005) showed that Maguire daisy flowers are primarily self-incompatible. Because of the open nature of the flower head, Maguire daisies tend to be visited by opportunistic insects searching for nectar. The primary flower visitors are the solitary composite specialist bee, *Perdita aridella*, and several species of native sweat bees (family *Halictidae*). Florets need to be visited by pollinators, on average, only a few times for pollination to occur. Fruit set for this species does not appear to be a limiting factor with 15% to 30% of flowers containing fruit during any week of the appropriate season (Alston and Tepedino 2005).

In 1992, Van Buren and Harper began demographic and genetic studies of the Maguire daisy at two sites located in the San Rafael Swell and one site in Capitol Reef National Park. In 1998, an additional study site in Capitol Reef was added. The demographic data collected included plant diameter, size class, plant height, plant condition and number of flowers produced. Data from these studies indicated that the species is long lived, but that some populations were prone to disturbance by flash flooding. By 1993, the genetic work of Van Buren and Harper had determined that *Erigeron maguirei* var. *maguirei* and *Erigeron maguirei* var. *harrisonii* were not distinct, leading to subsequent down-listing from "endangered" to "threatened" (Van Buren 1993).

Status and Distribution

The Maguire daisy grows on sand and detritus weathered from Navajo Sandstone and, rarely, on the Kayenta Formation in slickrock-crevices, on ledges, and in bottoms of washes. It occurs between elevations of 5250 to 8200 feet (1600 to 2500 meters). This species occurs mainly on exposed sandstone mesas and in steep, narrow canyons cut in the Navajo Sandstone formation. It can also be found on the Carmel, Chinle, and Wingate formations (Kass 1990, Clark 2002). The populations that occur in crevices and fractures in the Navajo Sandstone formation have the highest numbers of individuals. The smaller populations of the Maguire daisy are found in sandy wash bottoms.

The daisy occurs mainly on the Navajo Sandstone formation in Douglas fir, ponderosa pine, pinyon, juniper, and mountain shrub communities. Conifers associated with the species include ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziesii*), pinyon (*Pinus edulis*), and juniper (*Juniperus osteosperma*). Commonly associated shrubs include dwarf mountain mahogany (*Cercocarpus intricatus*), Utah serviceberry (*Amelanchier utahensis*), thread snakeweed (*Gutierrezia microcephala*), sticky-leaf rabbitbrush (*Chrysothamnus viscidiflorus*), Bigelow sagebrush (*Artemisia bigelovii*), and greenleaf manzanita (*Arctostaphylos patula*). Associated forbs include hoary aster (*Machaeranthera canescens*), mountain pepperplant (*Lepidium montanum*), and Louisiana wormwood (*Artemisia ludoviciana*). Some associated grasses include muttongrass (*Poa fenderliania*), sandhill muly (*Muhlenbergia pungens*), blue grama (*Bouteloua gracilis*), and Indian ricegrass (*Achnatherum hymenoides*) (Kass 1990, Clark 2002).

The Maguire daisy occurs in the Canyonlands section of the Intermountain region (Cronquist et al. 1972). Populations of the Maguire daisy are found on BLM, National Park Service (NPS), State of Utah, and Fishlake National Forest (FNF) lands in Emery and Wayne Counties, Utah; including the San Rafael Swell and Capitol Reef National Park (Harper and Van Buren 1998).

At the time of listing in 1985, the entire population of Maguire daisy was known to consist of 5 to 7 plants at 3 sites (Anderson 1982). The 1995 Recovery Plan identified 7 separate populations with the total population estimated at 5,000 (USFWS). In 1996, Maguire daisy was downlisted from endangered to threatened because of the availability of new taxonomic and population information. Increased survey efforts identified broader plant distributions and larger population sizes than were previously known (Harper and Van Buren 1998; Clark and Clark 1999; Clark 2001; Clark 2002; Clark et al. 2005; Clark et al. 2006). There are currently 9 known populations (118 sites) within 5 meta-populations comprised of approximately 162,250 Maguire daisy individuals (Clark et al. 2006). The range of the species is estimated at approximately 390 square miles and extends from the San Rafael Swell south through the Waterpocket Fold of Capital Reef National Park. (Clark et al. 2006).

In the Recovery plan, the threats to the Maguire daisy stem primarily from mineral and energy exploration and development, off-highway vehicle (OHV) use, and livestock trampling. However, the majority of Maguire daisy locations are relatively secure from direct impacts, although trampling due to OHV use and livestock are localized threats in some areas. It is expected that some of the smaller populations may consist of too few members to ensure their long-term survival.

Environmental Baseline

Status of the Species within the Action Area

The planning area contains 3 of the 4 known metapopulations of the Maguire daisy, and 6 of the 9 total known populations:

- Northern San Rafael Swell Meta-Population, Emery County: within this metapopulation, the northern and easternmost portions of the Calf Canyon population (comprising 25% of the total population area) occur within the PFO planning area. This population was estimated at 2,000 individuals within 3 sites in 1980, however the current population estimate is unknown (Clark et al. 2006).
- The Central San Rafael Swell Meta-Population, Emery County: this metapopulation occurs south of the Northern San Rafael Swell Meta-Population and is comprised of three populations: Coal Wash, Secret Mesa, and Link Flats (Clark et al. 2005). These populations total approximately 10,350 plans in 22 sites, 19 of which are on BLM land. 2 sites from Secret Mesa and one from Link Flats occur on state land.
- The Southern San Rafael Swell Meta-Population, Emery County: this metapopulation is comprised of 2 populations: the northern John's Hole and the southern Seger's Hole (Clark et al. 2006). Both of these populations occur on lands administered by the BLM in Emery County, Utah, within the PFO planning area. The John's Hole population is estimated at 300 individuals from 3 sites. The Seger's Hole population is estimated at 100 individuals from 2 sites (Clark et al. 2006).

Factors Affecting Species Environment within the Action Area

As identified in the 1995 Recovery Plan, primary threats include mineral and energy exploration and development, off-road recreational use, and livestock trampling.

Effects of the Action

Cultural Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program include minor surface disturbance for cultural resource excavations. Activities under this program may increase localized foot traffic, motorized traffic, and use of tools in Maguire daisy habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Paleontological Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities under this program include minor surface disturbance for fossil resource excavations. Activities under this program may increase localized foot traffic, motorized traffic, and use of tools in Maguire daisy habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Fire and Fuels Management

Major activities associated with the BLM's fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Although the BLM does not propose to carry out prescribed fire or non-fire treatments (mechanical and chemical) within suitable habitat for the Maguire daisy, wildland fire suppression activities could adversely affect the Maguire daisy. Activities under this program may result in increased foot or motorized traffic and application of chemicals (fire retardants, pesticides, insecticides) in suitable Maguire daisy habitats. These activities may cause trampling or crushing of individuals; increased soil disturbance; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment, increased plant damage or individual mortality, and a potential for long-term population declines.

Forestry and Woodlands Resources

The forest management program implements silvicultural practices including site preparation, regeneration, stand protection, stand maintenance, pre-commercial and commercial thinning for density management, fertilization, pruning, forest and woodland condition restoration treatments, and salvage harvest. The program allows the treatment of forest insect and disease infestations by spraying, cutting, and removal; and herbicidal spraying of grasses and shrubs. Forest management actions may also include conducting surveys, obtaining easements, pursuing legal access, allowing road development, and installing drain culverts and water bars. Wood and seed collection as well as non-commercial harvest of posts and Christmas trees are also authorized under this program.

Although activities authorized under this program are not likely to occur in Maguire daisy habitat, there is some potential for private individuals to trample Maguire daisy individuals while harvesting wood products. Known populations of Maguire daisy, and potential habitats have not

been specifically protected from fuel wood, Christmas tree, and post and pole harvesting. As a result, there may be decreased seed production; decreased recruitment; increased illegal collection of individuals due to increased human access; and increased occurrence of plant damage or individual mortality.

Geology and Minerals Management

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may result in increased foot traffic and motorized traffic, significant soil disturbance; increased energy development of facilities, and increased mineral excavation in Maguire daisy habitat. These activities may cause trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; loss, modification, or degradation of suitable habitat; reduced seed banks; loss of pollinator populations; increased occurrences of invasive plant species; and increased occurrence of illegal collection due to increased human access due to increased human access. As a result, there may be loss or degradation of plant populations and habitat; decreased Maguire daisy seed production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Hazardous Materials Management

Activities conducted under the BLM's hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Activities occurring under this program may increase foot traffic, motorized traffic, and significant soil disturbance in Maguire daisy suitable habitat. Associated impacts include: trampling or crushing of individuals, removal of suitable habitat, modification or degradation to suitable habitat, seed bank reductions, loss of pollinators, and increased occurrences of invasive plant species. As a result, there may be loss or degradation of plant populations and habitat; decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Lands and Realty

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way.

Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities authorized under this program may adversely impact Maguire daisy with human- and equipment-related soil disturbances. Soil disturbance, erosion, and compaction may impact individual plants, modify or degrade suitable habitat, reduce pollinator populations, and reduce the seed bank. Land exchanges may result in fragmentation or degradation of potential Maguire daisy habitat. As a result, there may be loss or degradation of plant populations and habitat; decreased recruitment; and increased occurrence of plant damage and individual mortality.

Livestock Grazing

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire Management, or vegetative treatments – see Vegetation Management). Other range improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder other species within the habitat: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase and concentrate domestic ungulate presence; increase motorized traffic; and surface disturbance from fence and livestock pond construction in Maguire daisy suitable habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about BLM's recreational resources, and assessing effects of recreational use on the natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Activities occurring under this program may increase human, horse, and motorized traffic in Maguire daisy suitable habitat. Associated impacts from these activities include trampling or crushing of individuals, illegal collection of individuals due to increased human access, loss, modification or degradation to suitable habitat, reduced seed banks, and increased occurrences of invasive plant species. As a result, there may be decreased recruitment, and increased occurrence of plant damage or individual mortality.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Activities occurring under this program may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Maguire daisy habitats. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; reduced pollinator populations; and increased occurrence of invasive plant species. As a result, there may be decreased recruitment and increased plant damage or individual mortality.

Vegetation Management

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Management activities occurring under this program may increase foot traffic, motorized presence, and vegetation treatments in Maguire daisy suitable habitat. Associated impacts include trampling or crushing of individuals, loss, modification or degradation of suitable habitat, reductions in seed banks, reduced pollinator populations, and increased occurrences of invasive plant species. As a result, there may be decreased seed production, decreased recruitment, and increased occurrence of plant damage or individual mortality.

Wild Horse and Burro Management

The objective of wild horse and burro management is the protection, management, and control of wild free-roaming horses and burros (WH&B) on public lands. Management includes maintaining viable herds that will preserve the free-roaming nature of WH&Bs in a manner that is designed to achieve and maintain thriving ecological balance on the public lands.

Activities occurring under this program may increase foot traffic and motorized traffic related to herd gathering and holding pen construction activities in Uinta basin hookless plant suitable habitat. Herd gathering intentionally concentrates horses, further disturbing habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Wildlife and Fisheries Management

This program aims to maintain biological diversity, support UDWR Herd Management Plans, improve habitat on for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase foot traffic and motorized traffic related to herd gathering and holding pen construction activities in Maguire daisy suitable habitat. Herd gathering intentionally concentrates horses, further disturbing habitat. These activities may increase the occurrence of trampling or crushing of individuals, increase soil disturbance, soil compaction and erosion; increase occurrence of exotic plant species; reduce pollinator populations and remove, modify or degrade suitable habitat. As a result, there may be increased occurrence of plant damage or individual mortality and loss of habitat.

Transportation and Access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Activities occurring under this program occurring may increase localized foot traffic, motorized traffic, and use of tools and heavy machinery in suitable Barneby reed mustard habitats. Land treatments may lead to short-term increased soil erosion, and storm water runoff with heavy concentrations of sediment. Associated impacts may include: trampling or crushing of individuals; increased soil disturbance; soil erosion and compaction; removal, degradation, or alteration of key habitat; reduced seed banks; and increased occurrence of invasive plant species. As a result, there may be loss or degradation of plant populations and habitat; decreases in production; decreased recruitment; and increased occurrence of plant damage or individual mortality.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to the Maguire daisy under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' critical, suitable, or potential habitat;
- Encroachment of human development into a species' critical, suitable, or potential habitat; and
- Management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah;
    - County Governments in Utah;
    - Local Governments in Utah; and
    - Private landholders in Utah.

Maguire daisies occur primarily within BLM management boundaries. In these areas, Maguire daisy locations are surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Maguire daisies are susceptible to activities on State and private lands. Many of these activities, such as livestock grazing, oil and gas exploration and development, human population expansion and associated infrastructure (increased trails and roads), research, and recreation activities (e.g. off-road vehicles), are expected to continue on State and private lands within the Maguire daisy's range. Contributing as cumulative effects to the proposed action, all these activities will continue to affect Maguire daisy populations by increasing mortalities, injuring plants, adversely affecting pollinators, and further adversely impacting occupied and suitable habitat.

Conclusions

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including the resource protection measures that were incorporated into the project design.

After reviewing the current status of the Maguire daisy, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the USFWS's biological opinion that the Price Field Office Resource Management Plan, as proposed, is not likely to jeopardize the continued existence of the Maguire daisy. Critical habitat has not been designated for this species. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the BLM Land Use Plan. If project design cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated.

2. All site-specific projects designed under the proposed BLM Land Use Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

COLORADO RIVER FISH

Bonytail (*Gila elegans*)

Status of the Species

Species / Critical Habitat Description

Bonytail are medium-sized (less than 600 mm) fish in the minnow family. Adult bonytail are gray or olive colored on the back with silvery sides and a white belly. The adult bonytail has an elongated body with a long, thin caudal peduncle. The head is small and compressed compared to the rest of the body. The mouth is slightly overhung by the snout and there is a smooth low hump behind the head that is not as pronounced as the hump on a humpback chub.

The bonytail is endemic to the Colorado River Basin and was historically common to abundant in warm-water reaches of larger rivers of the basin from Mexico to Wyoming. The species experienced a dramatic, but poorly documented, decline starting in about 1950, following construction of several mainstem dams, introduction of nonnative fishes, poor land-use practices, and degraded water quality (USFWS 2002).

Currently, no self-sustaining populations of bonytail are known to exist in the wild, and very few individuals have been caught anywhere within the basin. An unknown, but small number of wild adults exist in Lake Mohave on the mainstem Colorado River. Since 1977, only 11 wild adults have been reported from the upper basin (Valdez et al. 1994).

A total of 499 km (312 miles) of river has been designated as critical habitat for the bonytail in the Colorado River Basin, representing about 14% of the species' historic range (59 FR 13374). River reaches that have been designated as critical habitat in the Green River extend from the confluence with the Yampa River downstream to the boundary of Dinosaur National Monument and Desolation and Gray Canyons. In addition, critical habitat has been designated in the Yampa River from the upstream boundary of Dinosaur National Monument to its confluence with the Green River. Within the VFO, critical habitat has been designated in the following sections of the Colorado River Upper Basin (59 FR 13374).

> Utah, Uintah County; and Colorado, Moffat County. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the southern boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).
>
> Utah, Uintah and Grand Counties. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid (river mile 12) in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).

The USFWS has identified water, physical habitat, and the biological environment as the primary constituent elements of bonytail critical habitat (59 FR 13374). Water includes a quantity of water of sufficient quality delivered to a specific location in accordance with a hydrologic regime required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in

spawning and feeding, as a nursery, or serve as corridors between these areas. In addition, oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats. Food supply, predation, and competition are important elements of the biological environment. Recent information collected by the Recovery Program suggests that floodplain habitats may be more important to the survival and recovery of the bonytail than the USFWS originally thought.

Life History and Population Dynamics

The bonytail are considered a species that is adapted to mainstem rivers, where it has been observed in pools and eddies (Vanicek 1967, Minckley 1973). Spawning of bonytail has never been observed in a river, but ripe fish were collected in Dinosaur National Monument during late June and early July suggesting that spawning occurred at water temperatures of about 18□C (Vanicek and Kramer 1969). Similar to other closely related *Gila* species, bonytail probably spawn in rivers in spring over rocky substrates; spawning has been observed in reservoirs over rocky shoals and shorelines. It has been recently hypothesized that flooded bottomlands may provide important bonytail nursery habitat. Of five specimens captured most recently in the upper basin, four were captured in deep, swift, rocky canyons (Yampa Canyon, Black Rocks, Cataract Canyon, and Coal Creek Rapid), but the fifth was taken in Lake Powell. Since 1974, all bonytail captured in the lower basin have been caught in reservoirs. The diets of bonytail are presumed similar to that of the humpback chub (USFWS 2002a).

Status and Distribution

Bonytail are endemic to the Colorado River Basin and was historically common to abundant in warm-water reaches of larger rivers of the basin from Mexico to Wyoming. The species experienced a dramatic, but poorly documented, decline starting in about 1950, following construction of several mainstem dams, introduction of nonnative fishes, poor land-use practices, and degraded water quality (USFWS 2002a).

Currently, no self-sustaining populations of bonytail are known to exist in the wild, and very few individuals have been caught anywhere within the basin. An unknown, but small number of wild adults exist in Lake Mohave on the mainstem Colorado River. Since 1977, only 11 wild adults have been reported from the upper basin (Valdez et al. 1994).

Bonytail are the rarest native fish in the Colorado River. Little is known about its specific habitat requirements or cause of decline, because the bonytail was extirpated from most of its historic range prior to extensive fishery surveys. It was listed as endangered on April 23, 1980. Currently, no documented self-sustaining populations exist in the wild. Formerly reported as widespread and abundant in mainstem rivers (Jordan and Evermann 1896), its populations have been greatly reduced. Remnant populations presently occur in the wild in low numbers in Lake Mohave and several fish have been captured in Lake Powell and Lake Havasu (USFWS 2002a). The last known riverine area where bonytail were common was the Green River in Dinosaur National Monument, where Vanicek (1967) and Holden and Stalnaker (1970) collected 91 specimens during 1962-1966. From 1977 to 1983, no bonytail were collected from the Colorado or Gunnison rivers in Colorado or Utah (Wick et al. 1979, 1981; Valdez et al. 1982; Miller et al. 1984). However, in 1984, a single bonytail was collected from Black Rocks on the Colorado River (Kaeding et al. 1986). Several suspected bonytail were captured in Cataract Canyon in

1985-1987 (Valdez 1990). Current stocking plans are planned to continue for at least two more years, however, catch rates indicate stocking will continue until at least 2010 and probably longer (Thomas Czapla, personal communication).

Environmental Baseline

Status of the Species within the Action Area

Bonytail were once widespread in the large rivers of the Colorado River Basin (Cope and Yarrow 1875, Jordan 1891, Jordan and Evermann 1896, Gilbert and Scofield 1898, Kirsch 1889, Chamberlain 1904). The species experienced a dramatic, but poorly documented, decline starting in about 1950, following construction of mainstem dams, introduction of nonnative fishes, poor land-use practices, and degraded water quality (Miller 1961, Ono et al. 1983). A stocking program is being implemented to reestablish populations in the upper Colorado River basin.

In the Green River, Vanicek (1967) reported that bonytails were generally found in pools and eddies in the absence of, although occasionally adjacent to, strong current and at varying depths generally over silt and silt-boulder substrates. Adult bonytail captured in Cataract, Desolation, and Gray Canyons were sympatric with humpback chub in shoreline eddies among emergent boulders and cobble, and adjacent to swift current (Valdez 1990).

The USFWS designated seven reaches of the Colorado River system as critical habitat for the bonytail (59 FR 13374). This represents approximately 14 percent of the historical habitat of the species. Critical habitat for bonytail includes canyon reaches of the Yampa, Green and Colorado rivers. The designated critical habitat within the MFO is found on the Green River between the Yampa River and the Colorado River (74,644 meters) as well as between the Desolation area and the Gray Canyons area (130,729 meters) (USFWS 2002b).

Factors Affecting Species Environment within the Action Area

The primary threats to bonytail are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; hybridization with other native *Gila* species; and pesticides and pollutants (USFWS 2002a). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. The threats to bonytail in relation to flow regulation and habitat modification, predation by nonnative fishes, and pesticides and pollutants are essentially the same threats identified for Colorado pikeminnow. Threats to bonytail in relation to hybridization are essentially the same threats identified for humpback chub.

Management actions identified in the recovery goals for bonytail (USFWS 2002a) to minimize or remove threats to the species include:

- provide and legally protect habitat (including flow regimes necessary to restore and maintain required environmental conditions) necessary to provide adequate habitat and sufficient range for all life stages to support recovered populations;
- provide passage over barriers within occupied habitat to allow unimpeded movement and, potentially, range expansion;

- investigate options for providing appropriate water temperatures in the Gunnison River;
- minimize entrainment of subadults and adults at diversion/out-take structures;
- investigate habitat requirements for all life stages and provide those habitats;
- ensure adequate protection from overutilization;
- ensure adequate protection from diseases and parasites;
- regulate nonnative fish releases and escapement into the main river, floodplain, and tributaries;
- control problematic nonnative fishes as needed;
- minimize the risk of increased hybridization among *Gila* spp.;
- minimize the risk of hazardous-materials spills in critical habitat; and
- remediate water-quality problems.

Colorado pikeminnow (*Ptychocheilus lucius*)

Status of Species

Species / Critical Habitat Description

The Colorado pikeminnow is the largest cyprinid fish (minnow family) native to North America and evolved as the main predator in the Colorado River system. It is an elongated pike-like fish that during predevelopment times may have grown as large as 6 feet in length and weighed nearly 100 pounds (Behnke and Benson 1983). Today, Colorado pikeminnow rarely exceed 3 feet in length or weigh more than 18 pounds; such fish are estimated to be 45-55 years old (Osmundson et al. 1997). The mouth of this species is large and nearly horizontal with long slender pharyngeal teeth (located in the throat), adapted for grasping and holding prey. The diet of Colorado pikeminnow longer than 3 or 4 inches consists almost entirely of other fishes (Vanicek and Kramer 1969). Males become sexually mature earlier and at a smaller size than do females, though all are mature by about age 7 and 500 mm (20 inches) in length (Vanicek and Kramer 1969; Seethaler 1978; Hamman 1981). Adults are strongly countershaded with a dark, olive back, and a white belly. Young are silvery and usually have a dark, wedge-shaped spot at the base of the caudal fin.

Critical habitat was designated for Colorado pikeminnow on March 21, 1994 (59 FR 13374). Designated critical habitat makes up about 29% of the species' original range and occurs exclusively in the Upper Colorado River Basin. River reaches (including the 100-year floodplain) that make up critical habitat for Colorado pikeminnow within the VFO (59 FR 13374) include:

> Utah, Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties; and Colorado, Moffat County. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (Salt Lake Meridian).
>
> Colorado, Rio Blanco County; and Utah, Uintah County. The White River and its 100-year floodplain from Rio Blanco Lake Dam in T. 1 N., R. 96 W., section 6 (6th Principal

Meridian) to the confluence with the Green River in T. 9 S., R. 20 E., section 4 (Salt Lake Meridian).

The USFWS has identified water, physical habitat, and the biological environment as the primary constituent elements of critical habitat (59 FR 13374). Water includes a quantity of water of sufficient quality delivered to a specific location in accordance with a hydrologic regime required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these areas. In addition, oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats. Food supply, predation, and competition are important elements of the biological environment.

Life History and Population Dynamics

The Colorado pikeminnow is a long-distance migrator; adults move hundreds of miles to and from spawning areas, and require long sections of river with unimpeded passage. Adults require pools, deep runs, and eddy habitats maintained by high spring flows. These high spring flows maintain channel and habitat diversity, flush sediments from spawning areas, rejuvenate food production, form gravel and cobble deposits used for spawning, and rejuvenate backwater nursery habitats. Spawning occurs after spring runoff at water temperatures typically between 18 and 23°C. After hatching and emerging from spawning substrate, larvae drift downstream to nursery backwaters that are restructured by high spring flows and maintained by relatively stable base flows. Flow recommendations have been developed that specifically consider flow-habitat relationships in habitats occupied by Colorado pikeminnow in the upper basin, and were designed to enhance habitat complexity and to restore and maintain ecological processes. The following is a description of observed habitat uses in the Upper Colorado River Basin.

Colorado pikeminnow live in warm-water reaches of the Colorado River mainstem and larger tributaries, and require uninterrupted stream passage for spawning migrations and dispersal of young. The species is adapted to a hydrologic cycle characterized by large spring peaks of snow-melt runoff and low, relatively stable base flows. High spring flows create and maintain in-channel habitats, and reconnect floodplain and riverine habitats, a phenomenon described as the spring flood-pulse (Junk et al. 1989; Johnson et al. 1995). Throughout most of the year, juvenile, subadult, and adult Colorado pikeminnow use relatively deep, low-velocity eddies, pools, and runs that occur in near shore areas of main river channels (Tyus and McAda 1984; Valdez and Masslich 1989; Tyus 1990, 1991; Osmundson et al. 1995). In spring, however, Colorado pikeminnow adults use floodplain habitats, flooded tributary mouths, flooded side canyons, and eddies that are available only during high flows (Tyus 1990, 1991; Osmundson et al. 1995). Such environments may be particularly beneficial for Colorado pikeminnow because other riverine fishes gather in floodplain habitats to exploit food and temperature resources, and may serve as prey. Such low-velocity environments also may serve as resting areas for Colorado pikeminnow. River reaches of high habitat complexity appear to be preferred.

Because of their mobility and environmental tolerances, adult Colorado pikeminnow are more widely distributed than other life stages. Distribution patterns of adults are stable during most of the year (Tyus 1990, 1991; Irving and Modde 2000), but distribution of adults changes in late

spring and early summer, when most mature fish migrate to spawning areas (Tyus and McAda 1984; Tyus 1985, 1990, 1991; Irving and Modde 2000). High spring flows provide an important cue to prepare adults for migration and also ensure that conditions at spawning areas are suitable for reproduction once adults arrive. Specifically, bankfull or much larger floods mobilize coarse sediment to build or reshape cobble bars, and they create side channels that Colorado pikeminnow sometimes use for spawning (Harvey et al. 1993).

Colorado pikeminnow spawning sites in the Green River subbasin have been well documented. The two principal locations are in Yampa Canyon on the lower Yampa River and in Gray Canyon on the lower Green River (Tyus 1990, 1991). These reaches are 42 and 72 km long, respectively, but most spawning is believed to occur at one or two short segments within each of the two reaches. Another spawning area may occur in Desolation Canyon on the lower Green River (Irving and Modde 2000), but the location and importance of this area has not been verified. Although direct observation of Colorado pikeminnow spawning was not possible because of high turbidity, radiotelemetry indicated spawning occurred over cobble-bottomed riffles (Tyus 1990). High spring flows and subsequent post-peak summer flows are important for construction and maintenance of spawning substrates (Harvey et al. 1993). In contrast with the Green River subbasin, where known spawning sites are in canyon-bound reaches, currently suspected spawning sites in the upper Colorado River subbasin are at six locations in meandering, alluvial reaches (McAda 2000).

After hatching and emerging from the spawning substrate, Colorado pikeminnow larvae drift downstream to backwaters in sandy, alluvial regions, where they remain through most of their first year of life (Holden 1977; Tyus and Haines 1991; Muth and Snyder 1995). Backwaters and the physical factors that create them are vital to successful recruitment of early life stages of Colorado pikeminnow, and age-0 Colorado pikeminnow in backwaters have received much research attention (e.g., Tyus and Karp 1989; Haines and Tyus 1990; Tyus 1991; Tyus and Haines 1991; Bestgen et al. 1997). It is important to note that these backwaters are formed after cessation of spring runoff within the active channel and are not floodplain features. Colorado pikeminnow larvae occupy these in-channel backwaters soon after hatching. They tend to occur in backwaters that are large, warm, deep (average, about 0.3 m in the Green River), and turbid (Tyus and Haines 1991). Recent research (Day et al. 1999a, 1999b; Trammell and Chart 1999) has confirmed these preferences and suggested that a particular type of backwater is preferred by Colorado pikeminnow larvae and juveniles. Such backwaters are created when a secondary channel is cut off at the upper end, but remains connected to the river at the downstream end. These chute channels are deep and may persist even when discharge levels change dramatically. An optimal river-reach environment for growth and survival of early life stages of Colorado pikeminnow has warm, relatively stable backwaters, warm river channels, and abundant food (Muth et al. 2000).

Status and Distribution

Based on early fish collection records, archaeological finds, and other observations, the Colorado pikeminnow was once found throughout warm water reaches of the entire Colorado River Basin down to the Gulf of California, and including reaches of the upper Colorado River and its major tributaries, the Green River and its major tributaries, and the Gila River system in Arizona (Seethaler 1978). Colorado pikeminnow apparently were never found in colder, headwater

areas. The species was abundant in suitable habitat throughout the entire Colorado River Basin prior to the 1850s (Seethaler 1978). By the 1970s they were extirpated from the entire lower basin (downstream of Glen Canyon Dam) and portions of the upper basin as a result of major alterations to the riverine environment. Having lost some 75 to 80 percent of its former range due to habitat loss, the Colorado pikeminnow was federally listed as an endangered species in 1967 (Miller 1961, Moyle 1976, Tyus 1991, Osmundson and Burnham 1998). Full protection under the Act of 1973 occurred on January 4, 1974.

Colorado pikeminnow are presently restricted to the Upper Colorado River Basin and inhabit warm water reaches of the Colorado, Green, and San Juan rivers and associated tributaries (Figure 5). The Colorado pikeminnow recovery goals (USFWS 2002a) identify occupied habitat of wild Colorado pikeminnow as follows: the Green River from Lodore Canyon to the confluence of the Colorado River; the Yampa River downstream of Craig, Colorado; the Little Snake River from its confluence with the Yampa River upstream into Wyoming; the White River downstream of Taylor Draw Dam; the lower 89 miles of the Price River; the lower Duchesne River; the upper Colorado River from Palisade, Colorado, to Lake Powell; the lower 34 miles of the Gunnison River; the lower mile of the Dolores River; and 150 miles of the San Juan River downstream from Shiprock, New Mexico, to Lake Powell. Colorado pikeminnow have been stocked in recent years, changes to the stocking plan are awaiting population estimates. In recent years the pikeminnow has been increasing the Colorado river but decreasing in the Green river (Thomas Czapla, personal communication).

Environmental Baseline

Status of the Species within the Action Area

Preliminary population estimates presented in the Recovery Goals (USFWS 2002) for the three Colorado pikeminnow populations ranged from approximately 6,600 to 8,900 wild adults: Green River Subbasin, 6,000–8,000 (Nesler 2000, USFWS 2002); Upper Colorado River Subbasin, 600–900 (Nesler 2000, Osmundson 2002 [includes some subadults]); and San Juan River Subbasin, 19–50 (Holden 1999, USFWS 2002). The San Juan River Subbasin is not located in the project area. These numbers provided a general indication of the total wild adult population size at the time the Recovery Goals were developed, however, it was also recognized that the accuracy of the estimates vary among populations. Monitoring of Colorado pikeminnow populations is ongoing, and sampling protocols and the reliability of the population estimates are being assessed by the USFWS and cooperating entities.

For the period 1986–1997, the catch of adult Colorado pikeminnow per hour of electrofishing in the Green River steadily increased (McAda et al. 1998). Catch rates from the 1986–1988 period to the 1996–1997 period increased by three-fold from about 0.8 fish/hour to about 2.5 fish/hour. Relative condition of adult Colorado pikeminnow in the Green River declined between these two time periods, suggesting that the population was at or near carrying capacity under existing conditions. Recently, small adult Colorado pikeminnow have moved into the Price River, where they were not reported from surveys in the 1970's (Cavalli 1999), this also suggests dispersal as a result of carrying capacity (USFWS 2002). Studies indicate that significant recruitment of Colorado pikeminnow may not occur every year, but occurs in episodic intervals of several years (Osmundson and Burnham 1998).

Currently, two primary reaches of Colorado pikeminnow nursery habitat are present in the Green River system. The project area contains one of these reaches, occurring from near Green River, Utah, downstream to the Colorado River confluence (Tyus and Haines 1991, McAda et al. 1994a, McAda et al. 1994b, McAda et al. 1997). The reach of the Green River defined mostly by Desolation and Gray Canyons also provides nursery habitat for Colorado pikeminnow (Tyus and Haines 1991, Day et al. 1999b). These backwaters are especially important during the Colorado pikeminnow's critical first year of life.

Colorado River downstream of Westwater Canyon increased from 224 in 1992 to 512 in 1993 but decreased to 297 in 1994, for an average of 344 fish, or about 2 fish/km. Condition of Colorado pikeminnow declined following the 1991–1994 period, suggesting that the population was also at or near carrying capacity at current conditions (Osmundson 1999). In 1998, the estimates of Colorado pikeminnow upstream and downstream of Westwater Canyon were 435 and 330, respectively for a total of 765. Total estimates in 1999 and 2000 were 768 and 801 fish, respectively. Concurrent with these increases in population estimates, catch of adult Colorado pikeminnow per hour of electrofishing increased steadily for the period 1986–1997 (McAda et al. 1998). Catch rates from the 1986–1990 period to the 1995–1997 period increased by over ten times from about 0.1fish/hour to about 1.2 fish/hour.

Factors Affecting Species Environment within the Action Area

The primary threats to Colorado pikeminnow are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; and pesticides and pollutants (USFWS 2002a). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. These impairments are described in further detail below.

Stream flow regulation includes mainstem dams that cause the following adverse effects to Colorado pikeminnow and its habitat:

- block migration corridors,
- changes in flow patterns, reduced peak flows and increased base flows,
- release cold water, making temperature regimes less than optimal,
- change river habitat into lake habitat, and
- retain sediment that is important for forming and maintaining backwater habitats.

Cold water releases from dams eliminate suitable habitat for native fishes, including Colorado pikeminnow, from river reaches downstream for approximately 50 miles. In addition to main stem dams, many dams and water diversion structures occur in and upstream from critical habitat that reduce flows and alter flow patterns, which adversely affect critical habitat. Diversion structures in critical habitat divert fish into canals and pipes where the fish are permanently lost to the river system. It is unknown how many endangered fish are lost in irrigation systems, but in some years, in some river reaches, majority of the river flow is diverted into unscreened canals. High spring flows maintain habitat diversity, flush sediments from spawning habitat, increase invertebrate food production, form gravel and cobble deposits important for spawning, and maintain backwater nursery habitats (McAda 2000, Muth et al. 2000).

Predation and competition from nonnative fishes have been clearly implicated in the population reductions or elimination of native fishes in the Colorado River Basin (Dill 1944, Osmundson and Kaeding 1989, Behnke 1980, Joseph et al. 1977, Lanigan and Berry 1979, Minckley and Deacon 1968, Meffe 1985, Propst and Bestgen 1991, Rinne 1991). Data collected by Osmundson and Kaeding (1991) indicated that during low water years nonnative minnows capable of preying on or competing with larval endangered fishes greatly increased in numbers.

More than 50 nonnative fish species were intentionally introduced in the Colorado River Basin prior to 1980 for sportfishing, forage fish, biological control and ornamental purposes (Minckley 1982, Tyus et al. 1982, Carlson and Muth 1989). Nonnative fishes compete with native fishes in several ways. The capacity of a particular area to support aquatic life is limited by physical habitat conditions. Increasing the number of species in an area usually results in a smaller population of most species. The size of each species population is controlled by the ability of each life stage to compete for space and food resources and to avoid predation. Some life stages of nonnative fishes appear to have a greater ability to compete for space and food and to avoid predation in the existing altered habitat than do some life stages of native fishes. Tyus and Saunders (1996) cite numerous examples of both indirect and direct evidence of predation on razorback sucker eggs and larvae by nonnative species.

Threats from pesticides and pollutants include accidental spills of petroleum products and hazardous materials; discharge of pollutants from uranium mill tailings; and high selenium concentration in the water and food chain (USFWS 2002a). Accidental spills of hazardous material into critical habitat can cause immediate mortality when lethal toxicity levels are exceeded. Pollutants from uranium mill tailings cause high levels of ammonia that exceed water quality standards. High selenium levels may adversely affect reproduction and recruitment (Hamilton and Wiedmeyer 1990, Stephens et al. 1992, Hamilton and Waddell 1994, Hamilton et al. 1996, Stephens and Waddell 1998, Osmundson et al. 2000).

Humpback chub *(Gila cypha)*

Status of Species

Species / Critical Habitat Description

The humpback chub is a medium-sized freshwater fish (less than 500 mm) of the minnow family. The adults have a pronounced dorsal hump, a narrow flattened head, a fleshy snout with an inferior-subterminal mouth, and small eyes. It has silvery sides with a brown or olive colored back.

The humpback chub is endemic to the Colorado River Basin and is part of a native fish fauna traced to the Miocene epoch in fossil records (Miller 1946; Minckley et al. 1986). Humpback chub remains have been dated to about 4000 B.C., but the fish was not described as a species until the 1940s (Miller 1946), presumably because of its restricted distribution in remote white water canyons (USFWS 1990). Because of this, its original distribution is not known. The humpback chub was listed as endangered on March 11, 1967.

Until the 1950s, the humpback chub was known only from Grand Canyon. During surveys in the 1950s and 1960s humpback chub were found in the upper Green River including specimens from

Echo Park, Island Park, and Swallow Canyon (Smith 1960, Vanicek et al. 1970). Individuals were also reported from the lower Yampa River (Holden and Stalnaker 1975b), the White River in Utah (Sigler and Miller 1963), Desolation Canyon of the Green River (Holden and Stalnaker 1970) and the Colorado River near Moab (Sigler and Miller 1963).

Critical habitat was designated for humpback chub on March 21, 1994 (59 FR 13374). Designated critical habitat makes up about 28% of the species' original range and occurs in both the Upper and Lower Colorado River Basins. Although humpback chub life history and habitat use differs greatly from the other endangered Colorado River fish, the USFWS determined that the primary constituent elements (water, physical habitat, and biological environment) of their critical habitat were the same.

Critical habitat for humpback chub in the Green River system include the Yampa River within Dinosaur National Monument, Green River from its confluence with the Yampa River downstream to the southern boundary of Dinosaur National Monument, and the Green River within Desolation and Gray Canyons. Within the VFO, critical habitat has been designated in the following sections of the Colorado River Upper Basin (59 FR 13374).

> Utah, Uintah County; and Colorado, Moffat County. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the southern boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).
>
> Utah, Uintah and Grand Counties. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid (river mile 12) in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).

Life History and Population Dynamics

Unlike Colorado pikeminnow and razorback sucker, which are known to make extended migrations of up to several hundred miles to spawning areas, humpback chubs do not appear to make extensive migrations (Karp and Tyus 1990). Generally, humpback chub show fidelity for canyon reaches and move very little (Miller et al.. 1982; Archer et al.. 1985; Burdick and Kaeding 1985, Kaeding et al. 1990). Humpback chubs in Black Rocks (Valdez and Clemmer 1982), Westwater Canyon (Chart and Lentsch 1999a), and Desolation and Gray Canyons (Chart and Lentsch 1999b) do not migrate to spawn and movements of adult humpback chub in Black Rocks on the Colorado River were essentially restricted to a 1-mile reach. These results were based on the recapture of Carlin-tagged fish and radiotelemetry studies conducted from 1979 to 1981 (Valdez et al. 1982) and 1983 to 1985 (Archer et al. 1985, USFWS 1986, Kaeding et al. 1990).

In the Green River and upper Colorado River, humpback chubs spawned in spring and summer as flows declined shortly after the spring peak (Valdez and Clemmer 1982, Valdez et al. 1982, Kaeding and Zimmerman 1983, Tyus and Karp 1989, Karp and Tyus 1990, Chart and Lentsch 1999a and 1999b). Similar spawning periods were reported from Grand Canyon (Kaeding and Zimmerman 1983; Valdez and Ryel 1995, 1997). Although humpback chub are believed to broadcast eggs over mid-channel cobble and gravel bars, spawning in the wild has not been observed for this species. Gorman and Stone (1999) reported that ripe male humpback chubs in

the Little Colorado River (LCR) aggregated in areas of complex habitat structure (i.e., matrix of large boulders and travertine masses combined with chutes, runs, and eddies, 0.5–2.0 m deep) and were associated with deposits of clean gravel.

Chart and Lentsch (1999b) estimated hatching dates for young *Gila* collected from Desolation and Gray Canyons between 1992 and 1995. They determined that hatching occurred on the descending limb of the hydrograph as early as 9 June 1992 at a flow of 139 m^3/s and as late as 1 July 1995 at a flow of 731 m^3/s. Instantaneous daily river temperatures on hatching dates over all years ranged from 20 to 22 □C.

Newly hatched larvae average 6.3–7.5 mm TL (Holden 1973, Suttkus and Clemmer 1977, Minckley 1973, Snyder 1981, Hamman 1982, Behnke and Benson 1983, Muth 1990), and 1-month-old fish are approximately 20 mm long (Hamman 1982). Unlike Colorado pikeminnow and razorback sucker, no evidence exists of long-distance larval drift (Miller and Hubert 1990, Robinson et al. 1998). Upon emergence from spawning gravels, humpback chub larvae remain in the vicinity of bottom surfaces (Marsh 1985) near spawning areas (Chart and Lentsch 1999a). Backwaters, eddies, and runs have been reported as common capture locations for young-of-year humpback chub (Valdez and Clemmer 1982). These data indicate that in Black Rocks and Westwater Canyon, young utilize shallow areas. Habitat suitability index curves developed by Valdez et al. (1990) indicate young-of-year prefer average depths of 2.1 feet with a maximum of 5.1 feet. Average velocities were reported at 0.2 feet per second.

Valdez et al. (1982), Wick et al. (1979), and Wick et al. (1981) found adult humpback chub in Black Rocks and Westwater Canyons in water averaging 50 feet in depth with a maximum depth of 92 feet. In these localities, humpback chub were associated with large boulders and steep cliffs.

Status and Distribution

Failure to recognize *Gila cypha* as a species until 1946 complicated interpretation of historic distribution of humpback chubs in the Green River (Douglas et al. 1989, 1998). Best available information indicates that before Flaming Gorge Dam, humpback chubs were distributed in canyon regions throughout much of the Green River, from the present site of Flaming Gorge Reservoir downstream through Desolation and Gray canyons (Vanicek 1967; Holden and Stalnaker 1975a; Holden 1991). In addition, the species occurred in the Yampa and White rivers. Pre-impoundment surveys of the Flaming Gorge Reservoir basin (Bosley 1960; Gaufin et al. 1960; McDonald and Dotson 1960; Smith 1960) reported both humpback chubs and bonytails from the Green River near Hideout Canyon, now inundated by Flaming Gorge Reservoir.

Historic collection records of humpback chub exist from the Yampa and White rivers, both tributaries to the Green River. Tyus (1998) verified the presence of seven humpback chubs in collections of the University of Colorado Museum, collected from the Yampa River in Castle Park between 19 June and 11 July 1948. A single humpback chub was found in the White River near Bonanza, Utah, in June 1981 (Miller et al. 1982b), and a possible bonytail-humpback chub intergrade was also captured in July 1978 (Lanigan and Berry 1981).

Present concentrations of humpback chub in the Upper Basin occur in canyon-bound river reaches ranging in length from 3.7 km (Black Rocks) to 40.5 km (Desolation and Gray

Canyons). Humpback chubs are distributed throughout most of Black Rocks and Westwater Canyons (12.9 km), and in or near whitewater reaches of Cataract Canyon (20.9 km), Desolation and Gray Canyons (65.2 km), and Yampa Canyon (44.3 km), with populations in the separate canyon reaches ranging from 400 to 5,000 adults (see population dynamics). The Utah Division of Wildlife Resources has monitored the fish community in Desolation and Gray Canyons since 1989 and has consistently reported captures of age-0, juvenile, and adult *Gila,* including humpback chub, indicating a reproducing population (Chart and Lentsch 1999b). Distribution of humpback chubs within Whirlpool and Split Mountain Canyons is not presently known, but it is believed that numbers of humpback chub in these sections of the Green River are low.

The Yampa River is the only tributary to the Green River presently known to support a reproducing humpback chub population. Between 1986 and 1989, Karp and Tyus (1990) collected 130 humpback chubs from Yampa Canyon and indicated that a small but reproducing population was present. Continuing captures of juveniles and adults within Dinosaur National Monument indicate that a population persists in Yampa Canyon (T. Modde, USFWS, personal communication). Small numbers of humpback chub also have been reported in Cross Mountain Canyon on the Yampa River and in the Little Snake River about 10 km upstream of its confluence with the Yampa River (Wick et al. 1981; Hawkins et al. 1996).

Environmental Baseline

Status of the Species within the Action Area

Six self-sustaining populations of humpback chub are known to exist, three of which are in the action area:

Westwater Canyon, Colorado River, Utah – 2,900-6,500
Desolation/Gray Canyons, Green River, Utah -- 1,500
Cataract Canyon, Colorado River, Utah – 500

Each population consists of a discrete group of fish, geographically separated from the other populations, but with some exchange of individuals. The designated critical habitat within the MFO is found on the Green River between the Desolation area and the Gray Canyons area (130,729 meters), and on the Colorado River from Westwater Canyon Area (125,972 meters).

Peak hatch of *Gila* larvae in Westwater Canyon on the Colorado River appears to occur on the descending limb of the hydrograph following spring runoff at maximum daily water temperatures of approximately 20 to 21□C (Chart and Lentsch 1999a). Tyus and Karp (1989) reported that humpback chubs occupy and spawn in and near shoreline eddy habitats and that spring peak flows were important for reproductive success because availability of these habitats is greatest during spring runoff. The presence of a juvenile population suggests spawning may occur in the Upper Colorado River at Black Rocks, Westwater Canyon, Cataract Canyon, and Desolation/Gray Canyon (UDWR 2007).

Factors Affecting Species Environment within the Action Area

Although historic data are limited, the apparent range-wide decline in humpback chubs is likely due to a combination of factors including alteration of river habitats by reservoir inundation,

changes in stream discharge and temperature, competition with and predation by introduced fish species, and other factors such as changes in food resources resulting from stream alterations (USFWS 1990).

The primary threats to humpback chub are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; parasitism; hybridization with other native *Gila* species; and pesticides and pollutants (USFWS 2002). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. The threats to humpback chub in relation to flow regulation and habitat modification, predation by nonnative fishes, and pesticides and pollutants are essentially the same threats identified for Colorado pikeminnow.

Hybridization with roundtail chub (*Gila robusta*) and bonytail, where they occur with humpback chub, is recognized as a threat to humpback chub. A larger proportion of roundtail chub have been found in Black Rocks and Westwater Canyon during low flow years (Kaeding et al. 1990, Chart and Lentsch 2000), which increase the chances for hybridization.

Management actions identified in the recovery goals for humpback chub (USFWS 2002) to minimize or remove threats to the species included:

- provide and legally protect habitat (including flow regimes necessary to restore and maintain required environmental conditions) necessary to provide adequate habitat and sufficient range for all life stages to support recovered populations,
- investigate the role of the mainstem Colorado River in maintaining the Grand Canyon population,
- investigate the anticipated effects of and options for providing warmer water temperatures in the mainstem Colorado River through Grand Canyon,
- ensure adequate protection from overutilization,
- ensure adequate protection from diseases and parasites,
- regulate nonnative fish releases and escapement into the main river, floodplain, and tributaries,
- control problematic nonnative fishes as needed,
- minimize the risk of increased hybridization among *Gila* spp., and
- minimize the risk of hazardous-materials spills in critical habitat.

Razorback sucker (*Xyrauchen texanus*)

Status of Species

Species / Critical Habitat Description

Like all suckers (family Catostomidae, meaning "down mouth"), the razorback sucker has a ventral mouth with thick lips covered with papillae and no scales on its head. In general, suckers are bottom browsers, sucking up or scraping off small invertebrates, algae, and organic matter with their fleshy, protrusible lips (Moyle 1976). The razorback sucker is the only sucker with an abrupt sharp-edged dorsal keel behind its head. The keel becomes more massive with age. The head and keel are dark, the back is olive-colored, the sides are brownish or reddish, and the

abdomen is yellowish white (Sublette et al. 1990). Adults often exceed 3 kg (6 pounds) in weight and 600 mm (2 feet) in length. Like Colorado pikeminnow, razorback suckers are long-lived, living 40-plus years.

Critical habitat was designated for razorback sucker on March 21, 1994 (59 FR 13374). Designated critical habitat makes up about 49% of the species' original range and occurs in both the Upper and Lower Colorado River Basins (USFWS 1994). The primary constituent elements are the same as those described for Colorado pikeminnow. River reaches (including the 100-year floodplain) that make up critical habitat for Colorado razorback sucker within the VFO (59 FR 13374) include:

> Utah, Uintah County; and Colorado, Moffat County. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to Sand Wash in T. 11 S., R. 18 E., section 20 (6th Principal Meridian).
>
> Utah, Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties. The Green River and its 100-year floodplain from Sand Wash at river mile 96 at T. 11 S., R. 18 E., section 20 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (6th Principal Meridian).
>
> Utah, Uintah County. The White River and its 100-year floodplain from the boundary of the Uintah and Ouray Indian Reservation at river mile 18 in T. 9 S., R. 22 E., section 21 (Salt Lake Meridian) to the confluence with the Green River in T. 9 S., R 20 E., section 4 (Salt Lake Meridian).
>
> Utah, Uintah County. The Duchesne River and its 100-year floodplain from river mile 2.5 in T. 4 S., R. 3 E., section 30 (Salt Lake Meridian) to the confluence with the Green River in T. 5 S., R. 3 E., section 5 (Uintah Meridian).

The USFWS has identified water, physical habitat, and the biological environment as the primary constituent elements of critical habitat (59 FR 13374). Water includes a quantity of water of sufficient quality delivered to a specific location in accordance with a hydrologic regime required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these areas. In addition, oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats. Food supply, predation, and competition are important elements of the biological environment. The USFWS gave special consideration to habitats required for razorback sucker reproduction and recruitment when critical habitat was designated.

Life History and Population Dynamics

McAda and Wydoski (1980) and Tyus (1987) reported springtime aggregations of razorback suckers in off-channel habitats and tributaries; such aggregations are believed to be associated with reproductive activities. Tyus and Karp (1990) and Osmundson and Kaeding (1991) reported off-channel habitats to be much warmer than the mainstem river and that razorback

suckers presumably moved to these areas for feeding, resting, sexual maturation, spawning, and other activities associated with their reproductive cycle. Prior to construction of large mainstem dams and the suppression of spring peak flows, low velocity, off-channel habitats (seasonally flooded bottomlands and shorelines) were commonly available throughout the Upper Basin (Tyus and Karp 1989, Osmundson and Kaeding 1991). Dams changed riverine ecosystems into lakes by impounding water, which eliminated these off-channel habitats in reservoirs. Reduction in spring peak flows eliminates or reduces the frequency of inundation of off-channel habitats. The absence of these seasonally flooded riverine habitats is believed to be a limiting factor in the successful recruitment of razorback suckers in their native environment (Tyus and Karp 1989, Osmundson and Kaeding 1991). Wydoski and Wick (1998) identified starvation of larval razorback suckers due to low zooplankton densities in the main channel and loss of floodplain habitats which provide adequate zooplankton densities for larval food as one of the most important factors limiting recruitment.

These fish can spawn as early as age 3 or 4, when they are 14 or more inches long. Depending on water temperature, spawning can take place as early as November or as late as June. In the upper Colorado River basin, razorbacks typically spawn between mid-April and mid-June. These fish reportedly migrate long distances to spawn, congregating in large numbers in spawning areas. While razorback suckers have never been directly observed spawning in turbid riverine environments within the Upper Basin, captures of ripe specimens (in spawning condition), both males and females, have been recorded (Valdez et al. 1982, McAda and Wydoski 1980, Tyus 1987, Osmundson and Kaeding 1989, Tyus and Karp 1989, Tyus and Karp 1990, Osmundson and Kaeding 1991, Platania 1990) in the Yampa, Green, Colorado, and San Juan rivers. Sexually mature razorback suckers are generally collected on the ascending limb of the hydrograph from mid-April through June and are associated with coarse gravel substrates (depending on the specific location).

Outside of the spawning season, adult razorback suckers occupy a variety of shoreline and main channel habitats including slow runs, shallow to deep pools, backwaters, eddies, and other relatively slow velocity areas associated with sand substrates (Tyus 1987, Tyus and Karp 1989, Osmundson and Kaeding 1989, Valdez and Masslich 1989, Osmundson and Kaeding 1991, Tyus and Karp 1990).

Habitat requirements of young and juvenile razorback suckers in the wild are not well known, particularly in native riverine environments. Prior to 1991, the last confirmed documentation of a razorback sucker juvenile in the Upper Basin was a capture in the Colorado River near Moab, Utah (Taba et al. 1965). In 1991, two early juvenile (36.6 and 39.3 mm total length (TL)) razorback suckers were collected in the lower Green River near Hell Roaring Canyon (Gutermuth et al. 1994). Juvenile razorback suckers have been collected in recent years from Old Charley Wash, a wetland adjacent to the Green River (Modde 1996). Between 1992 and 1995 larval razorback suckers were collected in the middle and lower Green River and within the Colorado River inflow to Lake Powell (Muth 1995). In 2002, eight larval razorback suckers were collected in the Gunnison River (Osmundson 2002). No young razorback suckers have been collected in recent times in the Colorado River.

The razorback suckers are adapted to the widely fluctuating physical environment of the historical Colorado River. Adults can live 44-50 years and, once reaching maturity between two

and seven years of age (Minckley 1983), apparently produce viable gametes even when quite old. Survival adaptations included the ability to spawn in a variety of habitats and flows regimes, and over a long season. In the event of several consecutive years with little or no recruitment (due to either too much or too little water), the demographics of the population as a whole might shift, but future reproduction would not be compromised. Average fecundity recorded in studies ranged from 100,800 to 46,740 eggs per female (Bestgen 1990). With varying age of maturity and the fecundity of the species, historically it would have been possible to quickly repopulate after a catastrophic loss of adults.

Status and Distribution

On March 14, 1989, the USFWS was petitioned to conduct a status review of the razorback sucker. Subsequently, the razorback sucker was designated as endangered under a final rule published on October 23, 1991 (56 FR 54957). The final rule stated "Little evidence of natural recruitment has been found in the past 30 years, and numbers of adult fish captured in the last 10 years demonstrate a downward trend relative to historic abundance. Significant changes have occurred in razorback sucker habitat through diversion and depletion of water, introduction of nonnative fishes, and construction and operation of dams" (56 FR 54957). Recruitment of razorback suckers to the population continues to be a problem.

Historically, razorback suckers were found in the mainstem Colorado River and major tributaries in Arizona, California, Colorado, Nevada, New Mexico, Utah, Wyoming, and in Mexico (Ellis 1914, Minckley 1983). Bestgen (1990) reported that this species was once so numerous that it was commonly used as food by early settlers and, further, that commercially marketable quantities were caught in Arizona as recently as 1949. In the Upper Basin, razorback suckers were reported in the Green River to be very abundant near Green River, Utah, in the late 1800s (Jordan 1891). An account in Osmundson and Kaeding (1989) reported that residents living along the Colorado River near Clifton, Colorado, observed several thousand razorback suckers during spring runoff in the 1930s and early 1940s. In the San Juan River drainage, Platania and Young (1989) relayed historical accounts of razorback suckers ascending the Animas River to Durango, Colorado, around the turn of the century.

Currently, the largest concentration of razorback sucker remaining in the Colorado River Basin is in Lake Mohave on the border of Arizona and California. Estimates of the wild stock in Lake Mohave have fallen precipitously in recent years from 60,000 as late as 1991, to 25,000 in 1993 (Marsh 1993, Holden 1994), to about 9,000 in 2000 (USFWS 2002b). Until recently, efforts to introduce young razorback sucker into Lake Mohave have failed because of predation by non-native species (Minckley et al. 1991, Clarkson et al. 1993, Burke 1994). While limited numbers of razorback suckers persist in other locations in the Lower Colorado River, they are considered rare or incidental and may be continuing to decline.

In the Upper Colorado River Basin, above Glen Canyon Dam, razorback suckers are found in limited numbers in both lentic (lake-like) and riverine environments. The largest populations of razorback suckers in the upper basin are found in the upper Green and lower Yampa rivers (Tyus 1987). In the Colorado River, most razorback suckers occur in the Grand Valley area near Grand Junction, Colorado; however, they are increasingly rare. Osmundson and Kaeding (1991) reported that the number of razorback sucker captures in the Grand Junction area has declined

dramatically since 1974. Between 1984 and 1990, intensive collecting effort captured only 12 individuals in the Grand Valley (Osmundson and Kaeding 1991). The wild razorback sucker population is considered extirpated from the Gunnison River (Burdick and Bonar 1997).

Razorback suckers are in imminent danger of extirpation in the wild. The virtual absence of any recruitment suggests a combination of biological, physical, and/or chemical factors that may be affecting the survival and recruitment of early life stages of razorback suckers. Within the Upper Basin, recovery efforts endorsed by the Recovery Program include the capture and removal of razorback suckers from all known locations for genetic analyses and development of discrete brood stocks. These measures have been undertaken to develop refugia populations of the razorback sucker from the same genetic parentage as their wild counterparts such that, if these fish are genetically unique by subbasin or individual population, then separate stocks will be available for future augmentation. Such augmentation may be a necessary step to prevent the extinction of razorback suckers in the Upper Basin. Razorback suckers will be stocked until at least 2010, current population estimates that stocking will likely continue after that date as well (Thomas Czapla, personal communication).

Environmental Baseline

In the action area, the razorback sucker currently occupies parts of the Green River Subbasin and the Upper Colorado River Subbasin (Upper Colorado River), and the San Juan River Subbasin (San Juan River) (USFWS 2002; 54 FR 54967; 54 FR 13374;).

The designated critical habitat within the MFO is found on the Green River between the Yampa River and the Colorado River (74,644 meters), between the Desolation area and the Gray Canyons area (130,729 meters), on the Colorado River from I-70 to the boundary with the Monticello FO (13,210 meters), and on the Colorado River from Westwater Canyon Area (125,972 meters).

Recently, tuberculate or ripe razorback suckers have been collected from reaches of the lower Green River in Labyrinth Canyon near the mouth of the San Rafael River at RM 97 (Tyus 1987, Miller and Hubert 1990, Muth 1995, Chart et al. 1999). Muth et al. (1998) suggested that many of the 439 razorback sucker larvae collected from the lower Green River between RM 28 and 97 during spring and early summer 1993–1996 had been spawned downstream of RM 110 (lower end of the Green River Valley reach), possibly near the mouth of the San Rafael River.

Collections in the lower Green River during 1993–1996 produced the first ever captures of razorback sucker larvae from this section of river. Razorback sucker larvae were collected each year in the Green River during 1992–1996. Mean catch per unit effort (CPUE) was highly variable among years and river reaches but it is unclear whether this was a true measure of population abundance or was biased by differences in sampling efficiency (Muth et al. 1998). Numbers of razorback sucker larvae captured per year ranged from 5 in 1995 to 222 in 1996 for the lower Green River.

Historically, floodplain habitats inundated and connected to the main channel by over-bank flooding during spring-runoff discharges would have been available as nursery areas for young razorback suckers in the Green River. Tyus and Karp (1990) associated low recruitment with reductions in floodplain inundation since 1962 (closure of Flaming Gorge Dam), and Modde et

al. (1996) associated years of high spring discharge and floodplain inundation in the middle Green River (1983, 1984, and 1986) with subsequent suspected recruitment of young adult razorback suckers. These floodplain habitats are essential for the survival and recruitment of larval fish. Relatively high zooplankton densities in these warm, productive habitats are necessary to provide adequate zooplankton densities for larval food. Loss or degradation of these productive floodplain habitats probably represents one of the most important factors limiting recruitment in this species (Wydoski and Wick 1998). The importance of these habitats is further underscored by the relationship between larval growth and mortality due to non-native predators (Bestgen et al. 1997). Predation by adult red shiners on larvae of native catostomids in flooded and backwater habitats of the Green or Colorado Rivers was documented by Ruppert et al. (1993) and Muth and Wick (1997). Water depletions and changes in timing of flows may reduce the quantity and availability of floodplain habitat, thus reducing larval growth and recruitment.

In the Upper Colorado River subbasin, the number of razorback sucker captured has decreased dramatically since 1974. There are only a few scattered adults in the mainstem Colorado River (Osmundson and Kaeding 1991). During a 2-year study (1979–1981), Valdez et al. (1982) captured only 52 individuals, all old adults, in a 465–km reach of the Colorado River from Rifle, Colorado, to Hite, Utah. No young razorback sucker have been captured anywhere in the upper Colorado River since the mid-1960s (Osmundson and Kaeding 1991).

Factors Affecting Species Environment within the Action Area

The primary threats to razorback sucker are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; and pesticides and pollutants (USFWS 2002b). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. The threats to razorback sucker are essentially the same threats identified for Colorado pikeminnow.

Management actions identified in the recovery goals for razorback sucker (USFWS 2002b) to minimize or remove threats to the species included:

- provide and legally protect habitat (including flow regimes necessary to restore and maintain required environmental conditions) necessary to provide adequate habitat and sufficient range for all life stages to support recovered populations;
- provide passage over barriers within occupied habitat to allow unimpeded movement and, potentially, range expansion;
- investigate options for providing appropriate water temperatures in the Gunnison River;
- minimize entrainment of subadults and adults in diversion/out-take structures;
- ensure adequate protection from overutilization;
- ensure adequate protection from diseases and parasites;
- regulate nonnative fish releases and escapement into the main river, floodplain, and tributaries;
- control problematic nonnative fishes as needed;
- minimize the risk of hazardous-materials spills in critical habitat;

- remediate water-quality problems; and minimize the threat of hybridization with white sucker

Effects of the Action

Cultural Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Surface-disturbing actions under this program could result in soil erosion and removal of upland vegetation within watersheds containing listed fish species could result in increased erosion and sediment that degrade water quantity (reducing ground water discharge into the stream, river, or lake) and water quality (changes in water chemistry, such as pH and dissolved oxygen; temperature; sediment loads; and nutrient availability). These changes in water quantity or quality can directly or indirectly affect listed fish species. Cultural resource activities may negatively affect the primary constituent elements for the Colorado River fish species designated critical habitat. Increased erosion may degrade water quality and increase sediment in the water. This could increase water temperature, decrease food supply, increase turbidity, and deplete oxygen. This could alter a specific hydraulic water regime which is required by a particular life stage for each species. In doing so, there may be decreases in quantity and quality of breeding, spawning, and nursery habitats and degradation of foraging habitats. As a result, there may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Paleontological Resources Management

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Surface-disturbing actions under this program could result in soil erosion and removal of upland vegetation within watersheds containing listed fish species could result in increased erosion and sediment that degrade water quantity (reducing ground water discharge into the stream, river, or lake) and water quality (changes in water chemistry, such as pH and dissolved oxygen; temperature; sediment loads; and nutrient availability). These changes in water quantity or quality can directly or indirectly affect listed fish species. Cultural resource activities may negatively affect the primary constituent elements for the Colorado River fish species designated critical habitat. Increased erosion may degrade water quality and increase sediment in the water. This could increase water temperature, decrease food supply, increase turbidity, and deplete oxygen. This could alter a specific hydraulic water regime which is required by a particular life stage for each species. In doing so, there may be decreases in quantity and quality of breeding, spawning, and nursery habitats and degradation of foraging habitats. As a result, there may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Fire and Fuels Management

Objectives of fire management are to protect life, property, and resources values from wildfire and restore the natural role of fire in the ecosystem. Major activities associated with the BLM's fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Increased vegetation disturbance or vegetation removal to support fire suppression activities or fires (wildland or prescribed), fire retardant or chemical treatment to vegetation, soil disturbance, and water removal may adversely impact Colorado fish. Associated impacts may include loss of vegetation cover, soil stability and forage base; and changes to water chemistry, water temperature, and nutrient levels, negatively affecting the primary constituent elements for Colorado fish species. As a result, there may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Geology and Minerals Management

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may increase human presence, equipment use, surface disturbance in Colorado River fish habitat. These actions may increase the occurrence of chemical leaks into drainages, vegetation disturbances or removal, soil disturbances, increased occurrence of invasive plant species, and pollutants in drainages of Colorado fish habitat. Vegetation disturbances or vegetation removal (including chemical treatment of vegetation), and increased invasive plant species may adversely affect cover, soil stability, forage base, water chemistry, water temperature, and nutrient levels. Pollutants in the area may affect Colorado River fish by decreasing water quality and impacting the forage base. Lethal and sublethal impacts may result from chemical spills. There may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Hazardous Materials Management

Activities conducted under the BLM's hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Activities occurring under this program may increase human presence, equipment use, surface disturbance in Colorado River fish habitat. These actions may increase the occurrence of

chemical leaks into drainages, vegetation disturbances or removal, soil disturbances, increased occurrence of invasive plant species, and pollutants in drainages of Colorado fish habitat. Vegetation disturbances or vegetation removal (including chemical treatment of vegetation), and increased invasive plant species may adversely affect cover, soil stability, forage base, water chemistry, water temperature, and nutrient levels. Pollutants in the area may affect Colorado River fish by decreasing water quality and impacting the forage base. Lethal and sublethal impacts may result from chemical spills. There may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Lands and Realty Management

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations, sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way. Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities occurring under this program may increase human presence, equipment and vehicle use, vegetation disturbance, and surface disturbance in the drainages of Colorado River fish habitats. These activities may result in direct water channel disturbance, vegetation disturbance or removal, increased occurrence of invasive plant species, and soil disturbance. Lands and realty management decisions may negatively affect the primary constituent elements for the Colorado River fish species designated critical habitat. Direct stream disturbances may adversely change the water channel morphology, structure, and water quality. Vegetation disturbances or removal (including chemical treatment of vegetation), may adversely affect cover, soil stability, forage base, water chemistry, water temperature, and nutrient levels. Pollutants in the area may decrease water quality and adversely impact the forage base. Land exchanges or disposals may fragment the watersheds in the action area, increasing the previously mentioned impacts. As a result, there may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Livestock Grazing Management

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Activities occurring under this program may increase equipment and vehicle use, vegetation disturbance, and surface disturbance in the drainages of Colorado River fish habitats. These activities may result in vegetation disturbance, removal, alteration; and soil disturbance. Vegetation alteration or removal may decrease: cover, soil stability, stream morphology, forage base, water chemistry, water temperature, and nutrient levels. Livestock management decisions may negatively affect the primary constituent elements for the Colorado River fish species designated critical habitat. Increased erosion associated with surface disturbance may degrade

water quality and increase sediment in the water. This could increase water temperature, decrease food supply, increase turbidity, and deplete oxygen. This could alter a specific hydraulic water regime which is required by a particular life stage for each species. As a result, there may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about recreational resources, and assessing effects of recreational use on the natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Activities occurring under this program may increase human presence, equipment and vehicle use, vegetation disturbance, and surface disturbance in the drainages of Colorado River fish habitats. These activities may result in direct water channel disturbance, vegetation disturbance or removal, increased occurrence of invasive plant species, and soil disturbance. Direct stream disturbances may adversely change the water channel morphology, structure, and water quality. Vegetation disturbances or removal (including chemical treatment of vegetation), may adversely affect: cover, soil stability, forage base, water chemistry, water temperature, and nutrient levels. Pollutants in the area may decrease water quality and adversely impact the forage base. As a result, there may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Activities occurring under this program may increase human presence, equipment and vehicle use, vegetation disturbance, and surface disturbance in the drainages of Colorado River fish habitats. These activities may result in direct water channel disturbance, vegetation disturbance or removal, increased occurrence of invasive plant species, and soil disturbance. Direct stream disturbances may adversely change the water channel morphology, structure, and water quality. Vegetation disturbances or removal (including chemical treatment of vegetation), may adversely affect: cover, soil stability, forage base, water chemistry, water temperature, and nutrient levels. Pollutants in the area may decrease water quality and adversely impact the forage base. As a result, there may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Vegetation Management

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Activities occurring under this program may increase human presence, equipment and vehicle use, vegetation treatment or disturbance (mechanical, chemical, biological), and surface disturbance in drainages of Colorado River fish habitats. These activities may result in vegetation disturbance or removal, adverse chemical treatment to vegetation, increased occurrence of invasive plant species, and soil disturbance. Vegetation disturbances, vegetation removal, chemical treatment of vegetation, or increased invasive plant species may adversely affect availability of riparian vegetation cover and water quality. In doing so, there may be decreases in quantity and quality of breeding, spawning, and nursery habitats and degradation of foraging habitats. As a result, there may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Wildlife and Fisheries Management

This program aims to maintain biological diversity, improve habitat for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase equipment and vehicle use, vegetation treatment or disturbance, and surface disturbance in drainages of Colorado River fish habitats. In the short-term, vegetation disturbances or vegetation removal may adversely affect availability of riparian vegetation, thereby impacting the watershed stability, vegetation cover, forage base, and water quality. Long-term benefits may include: increased bank stability, availability of habitat, and forage base. As a result of short-term and long-term effects, Colorado River fishes may have increased reproductive success and increased survival at all life stages.

Transportation and Access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Activities occurring under this program may increase human presence, equipment and vehicle use, vegetation disturbance, and surface disturbance in the drainages of Colorado River fish habitats. These activities may result in direct water channel disturbance, vegetation disturbance or removal, increased occurrence of invasive plant species, and soil disturbance. Lands and realty management decisions may negatively affect the primary constituent elements for the Colorado River fish species designated critical habitat. Direct stream disturbances may adversely change the water channel morphology, structure, and water quality. Vegetation

disturbances or removal (including chemical treatment of vegetation), may adversely affect cover, soil stability, forage base, water chemistry, water temperature, and nutrient levels. Pollutants in the area may decrease water quality and adversely impact the forage base. Land exchanges or disposals may fragment the watersheds in the action area, increasing the previously mentioned impacts. As a result, there may be decreases in reproductive success, and decreases in survival at all life stages (egg, larval, young of year, juvenile, and adult).

Water Depletions

Water depletions from the Upper Colorado River Basin are a major factor in the decline of the threatened and endangered Colorado River fish. The USFWS determined that any depletion will jeopardize their continued existence and will likely contribute to the destruction or adverse modification of their critical habitat (USDI, Fish and Wildlife Service, Region 6 Memorandum, dated July 8, 1997). However, the Recovery Program was established specifically to offset the negative effects of water depletions to the endangered fish populations, and to act as the Reasonable and Prudent Alternative for these depletions. Actual water depletions will be determined, and section 7 consultation reinitiated on a project-specific basis.

Cumulative Effects for the Bonytail, Colorado Pikeminnow, Humpback Chub, and Razorback Sucker

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to bonytail, Colorado pikeminnow, humpback chub, and razorback sucker under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns that would further fragment, modify, or destroy potential spawning sites or designated critical habitat.
- Shoreline recreational activities and encroachment of human development that would remove upland or riparian/wetland vegetation and potentially degrade water quality.
- Competition with, and predation by, exotic fish species introduced by anglers or other sources.
- Program management actions that would reduce the potential for catastrophic wildland fires, vegetation loss, and negative changes to water quality by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah
    - County Governments in Utah
    - Local Governments in Utah
    - Private landholders in Utah

Colorado fishes occur throughout the Upper Colorado River Basin of the action area for the proposed RMP amendment. The watersheds affecting Colorado fishes include a checkerboard pattern of land ownership including Federal, State, and private landowners. Colorado fishes are

susceptible to activities on State and private lands. Many of these activities, such as livestock grazing; research; construction and operation of dams along major waterways; water retention, diversion, or dewatering of springs, wetlands, or streams; oil and gas exploration and development; human population expansion and associated infrastructure (increased trails and roads); and recreation activities (e.g. off-road vehicles), are expected to continue on State and private lands within the Colorado fishes' range. Contributing as cumulative effects to the proposed action, these activities will continue to affect Colorado fishes' persistence with impacts to staging areas, spawning habitats, nursery habitats, and foraging habitat (including designated critical habitat), further degrading habitat, and increasing non-native fish populations.

Conclusion for the Bonytail, Colorado Pikeminnow, Humpback Chub, and Razorback Sucker

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including the resource protection measures that were incorporated into the project design.

It is our opinion that the proposed action are not likely to jeopardize the continued existence of the Colorado River Fishes, and are not likely to jeopardize the continued existence of these species or adversely modify their habitat. We base our conclusion on the following:

1. Treatment sizes will be limited during any single year, both in space and time, in the species range. Vegetation removed during project related activities will not impact large portions of the Upper Colorado River Basin and, with conservation measures applied, are not expected to significantly affect water quality or flows to impact the bonytail or its critical habitat.
2. In addition, the Recovery Programs for the endangered Colorado River fishes conduct intensive fish community monitoring throughout the potentially affected area. The USFWS is a participant on both programs and we believe that those monitoring programs, although not specifically designed to determine cause and affect relationships, will provide useful information to assess site-specific projects under the proposed action. The USFWS will rely heavily on the results of Recovery Program monitoring to determine if additional Section 7 consultation is required.
3. All site-specific projects designed under the proposed Resource Management Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

Western yellow-billed cuckoo *(Coccyzus americanus)*

Status of the Species

Species Description

The western yellow-billed cuckoo is one of two subspecies of the western yellow-billed cuckoo (UDWR 2003). The western yellow-billed cuckoo is approximately 12 in (31 cm) in length. The bird is brownish above and white below; with rusty colored flight feathers. The upper

mandible of the bill is black and the lower mandible is yellow. The underside of the tail has pairs of large white spots.

The western subspecies is found intermittently throughout the western United States in dense riparian vegetation, including cottonwood and willow stands, tamarisk thickets, Russian olive, willows, and orchards. They primarily consume insects such as caterpillars, cicadas, beetles, grasshoppers, and katydids, as well as lizards, frogs, eggs of other birds, berries, and small fruits.

Life History and Population Dynamics

Yellow-billed cuckoos are one of the latest migrants to arrive and breed in Utah. They arrive in extremely late May or early June and breed in late June through July. Cuckoos typically start their southerly migration by late August or early September. Yellow-billed cuckoos feed almost entirely on large insects that they glean from tree and shrub foliage. They feed primarily on caterpillars, including tent caterpillars. They also feed frequently on grasshoppers, cicadas, beetles, and katydids, occasionally on lizards, frogs, and eggs of other birds, and rarely on berries and fruits (Ehrlich et al. 1988, Kaufmann 1996).

Nesting habitat is classified as dense lowland riparian characterized by a dense sub-canopy or shrub layer (regenerating canopy trees, willows, or other riparian shrubs) within 100 m of water. Over story in these habitats may be either large, gallery-forming trees or developing trees, usually cottonwoods. Nesting habitats are found at low to mid-elevations (750-1820 m) in Utah. Cuckoos may require large tracts (40-80 ha) of contiguous riparian nesting habitat; however, cuckoos are not strongly territorial and home ranges may overlap during the breeding season. Nests are usually 1.2-2.4 m above the ground on the horizontal limb of a deciduous tree or shrub, but nest heights may range from 1-6 m and higher. The nest is a loosely arranged platform of twigs lined with softer materials such as grass, rootlets, and dried leaves. Nests are built in 1-3 days. The female lays 1-8 (usually 3) eggs over a period of several days; laying often begins before the nest is complete. Both males and females incubate eggs for a period of 9-11 days, beginning when the first egg is laid. Nestlings are altricial and hatch asynchronously over several days. Young are brooded by both adults for 7-8 days before leaving the nest, an unusually rapid development for a bird this size. Young climb on branches for about 2 weeks after leaving the nest until they are capable of flight at about 3 weeks of age. Both adults tend the fledglings, and in some cases early fledglings are attended by the male and later fledglings are attended by the female. It is not know whether cuckoos have more than one brood per season in Utah, but multiple brooding has been recorded in California.

Yellow-billed cuckoo nesting behavior may be closely tied to food abundance. In years of low food abundance, cuckoos may forego nesting; in years when the food supply is abundant, cuckoos may lay a large number of eggs and even parasitize the nests of other species (Nolan and Thompson 1975). Cuckoos are rarely hosts to brown-headed cowbirds.

Status and Distribution

In 2001, the western subspecies of the western yellow-billed cuckoo was designated as a candidate for listing (threatened or endangered status) under the ESA (66 Federal Register 38611-38626). The USFWS has found that the species population status warrants listing but

other, higher priority listing actions prevent them from addressing the cuckoo's status at this time.

This species occurs intermittently across the state. Historically, breeding was recorded in Weber, Salt Lake, Utah, and Washington Counties. Recent breeding has been confirmed in Salt Lake, Grand, and Uintah Counties. Although it is not known to breed throughout the state, it has been recorded in the riparian habitats of the following 14 counties: Wayne, Garfield, Box Elder, Cache, Davis, Salt Lake, Wasatch, Utah, Uintah, Grand, San Juan, Washington, Iron, and Juab. It is considered a candidate for listing in all of Utah's 29 counties except Rich (UDWR 2003).

Environmental Baseline

Status of the Species within the Action Area

The western yellow-billed cuckoo is listed as a candidate species due to loss of riparian habitat from agricultural use, water use, road development, and urban development. This species of cuckoo is a neotropical migrant that utilizes riparian valleys throughout the state. While no known population of this species exists at present within the PFO, there is potentially suitable habitat in the larger riparian areas throughout the PFO.

Factors Affecting Species Environment within the Action Area

Threats to the western yellow-billed cuckoo are related to habitat destruction and degradation from the invasion of tamarisk, livestock use of riparian areas, water withdrawals, and human development (UDWR 2003). The availability of suitable western yellow-billed cuckoo habitats in the Price region is seriously limited by dry conditions, narrowness of existing riparian zones, grazing and the presence of brown headed cowbirds.

Effects of the Action

Cultural Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up to several weeks. Inventories for cultural resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), and surface disturbance in potential western yellow-billed cuckoo habitat. Noise disturbances may cause avoidance of potential habitat. Vegetation disturbances or removal may decrease the availability of nesting habitat; decrease cover from predators; and decrease the availability of prey habitat. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species.

Paleontological Resources

This program includes surveys, inventories, excavation activities, surface material collection, and interpretive site development. Surveys may involve multiple people and vehicles and can last up

to several weeks. Inventories for paleontological resources commonly entail the use of hand tools, power tools, or heavy machinery.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), and surface disturbance in potential western yellow-billed cuckoo habitat. Noise disturbances may cause avoidance of potential habitat. Vegetation disturbances or removal may decrease the availability of nesting habitat; decrease cover from predators; and decrease the availability of prey habitat. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species.

Fire and Fuels Management

Objectives of fire management are to protect life, property, and resources values from wildfire and restore the natural role of fire in the ecosystem. Major activities associated with the fire management program include: wildfire suppression, wildland fire use, prescribed burning, non-fire fuels treatments (mechanical and chemical), and emergency stabilization and rehabilitation following wildfires. Fire suppression methods may involve: fireline construction, use of fire suppression agents and retardants, and water withdrawals.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), vegetation treatment or disturbance, and surface disturbance in potential western yellow-billed cuckoo habitat. Associated noise disturbances may cause avoidance of these habitats. Vegetation disturbances or vegetation removal decrease availability of nesting habitat; decrease cover from predator; and decrease prey habitat. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species. Long-term benefits of this program, as vegetation is reestablished, may include: increased insect prey abundance and increased potential habitat.

Forestry and Woodland Management Resources

The forestry and woodlands management program permits commercial timber harvest in order to promote forest health, and manages the commercial, non-commercial, and Native American harvest of woodland products including posts, Christmas trees and fuel wood.

Forest resources support activities such as road construction may occur in or near existing or suitable western yellow-billed cuckoo habitat. Impacts associated with these activities are described under the Lands and Realty Program effects analysis.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), vegetation treatment or disturbance, and surface disturbance in yellow-billed cuckoo habitat. Associated noise disturbances may cause avoidance of potential habitat. Vegetation disturbances, vegetation removal, or chemical treatment of vegetation decrease availability of nesting habitat and decrease prey populations and prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for yellow-billed cuckoo and their prey species. As a result,

there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species

Geology and Minerals Management

The planning area will be open to consideration for exploration, leasing, and development of leasable minerals (oil, gas, coal bed natural gas), salable minerals (sand, gravel, stone and humate) and locatable materials (uranium, clay and gypsum). Although stipulations or conditions may be included in the terms of these mineral contracts, there are potential impacts associated with these various activities. Mineral exploration and extraction often results in surface disturbance from road and facility construction, removal of topsoil and overburden, stock piling of these materials, and post-mining reclamation and recontouring.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), surface disturbance, and increased occurrence of chemical leaks in yellow-billed cuckoo habitat. Associated noise disturbances may cause avoidance of potential habitats. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for yellow-billed cuckoo and their prey species. Pollutants in the area may affect prey populations, and vegetation. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species

Hazardous Materials Management

Activities conducted under the hazardous materials program include providing warnings, securing and disposing of hazardous waste discharged on public lands, establishing precautions, and responding to emergencies. Activities may involve increased human presence, use of heavy equipment, and removal of contaminated soils. These activities have the potential to occur in locations where mineral development or transport occurs.

Mineral developments, pipelines, roads, and railroad transportation and access systems occur within all of the planning areas analyzed in this document, and have the potential to occur in yellow-billed cuckoo habitat. Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), vegetation treatment or disturbance, and surface disturbance in potential yellow-billed cuckoo habitat. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species

Lands and Realty Management

Objectives of the lands and realty management program are to support multiple-use management goals of the BLM resource programs; respond to public requests for land use authorizations,

sales, and exchanges; and acquire and designate rights of way access to serve administrative and public needs. Realty management authorizes occupancy of public lands for roads, power lines, pipelines, communication sites, and irrigation ditches authorized by granting rights of way. Rights of way management actions respond to public requests for access, land authorizations, sales, and exchanges. These rights of way may be temporary or extend up to 30 years, or even in perpetuity.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), vegetation disturbance, and surface disturbance in yellow-billed cuckoo habitat. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for yellow-billed cuckoo and their prey species. Exchange or sales of lands may lead to habitat fragmentation and loss. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species.

Livestock Grazing Management

The objective of livestock grazing management is to maintain or improve forage production and range condition as a sustainable resource base for livestock grazing on BLM land. Livestock management includes designating the kind and class of livestock, seasons of use, locations of use and the numbers of livestock that are permitted to use BLM lands.

Range management activities may include vegetation treatments such as prescribed fire, mechanical and chemical control of noxious weeds, sagebrush and other target species. The determinations and effects analyses associated with the potential impacts of these treatments can be located under the other appropriate program headings (i.e., fire treatments – see Fire and Fuels Management, or vegetative treatments – see Vegetation Management). Other range improvements authorized by the livestock grazing management program may include fence construction, water developments, exclosures, and livestock handling facilities.

There are four primary ways livestock manipulate habitats to favor/hinder some wildlife species: 1) alteration of vegetation composition, 2) cause increased/decreased productivity of selected plant species, 3) increase/decrease the nutritive quality of available forage, and/or 4) increase/decrease the diversity of habitats by altering structure (Severson and Urness 1994).

Activities occurring under this program may increase human presence (including associated noise disturbances), vegetation disturbance, and minor surface disturbance in yellow-billed cuckoo habitat. Vegetation disturbances, vegetation removal, or vegetation alteration may result in less dense vegetation; an increase in invasive plant species; increased fragmented habitat; reduced availability of nesting habitat; decreased cover from predators; and decreased availability prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species.

Recreation Management

The recreation program includes providing for and managing recreational access, developing and maintaining recreation areas, issuing special recreation permits, providing information to the public about BLM's recreational resources, and assessing effects of recreational use on the natural resources. Under this program, OHV use, camping, rafting, hiking, fishing, boating, swimming, and other activities are allowed in designated areas.

Authorized activities under this program have the potential to increase human presence, equipment and vehicle use (including associated noise disturbances), vegetation disturbance, and surface disturbance in potential yellow-billed cuckoo habitat. Associated noise disturbances may cause avoidance of potential habitat. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for yellow-billed cuckoo and their prey species. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species.

Riparian, Soils and Water Resources

The objectives for the riparian, soil and water resources management program are to maintain and improve soil integrity, riparian and wetland areas, and protect water quality. Many Best Management Practices (BMPs), designed under this program reduce sedimentation and protect water quality also benefit soil productivity by minimizing erosion. Examples of other protection measures implemented under this program include maintenance and restoration of appropriate biological soil crusts, management of watershed health, and manage salinity load. Generally, this management program provides information in support of other resource objectives and goals.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), vegetation manipulation, stream alteration, and minor surface disturbance in western yellow-billed cuckoo habitat. Short-term adverse impacts may include, but not be limited to: decreased nesting habitat; decreased cover from predators; decreased prey habitat; and alterations of water distribution within suitable habitat for western yellow-billed cuckoos. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species.

Vegetation Resources

Program objectives are to maintain or improve the diversity of plant communities to support timber production, livestock needs, wildlife habitat, watershed protection, and acceptable visual resources. Therefore, this program includes mechanical, chemical, biological, cultural vegetation management methodologies. These management methodologies may result in ground disturbing activities, chemical impacts, human disturbances, and impacts to vegetation from biological management techniques.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), vegetation treatment or disturbance (mechanical, chemical, biological), and surface disturbance in western yellow-billed cuckoo habitat. Associated noise disturbances may cause avoidance of available habitat. Vegetation alteration, removal, or inadvertent chemical treatment may adversely affect availability and quality of nesting habitat; decrease cover from predators; and decrease insect prey populations. Soil disturbances may increase erosion, adversely affect soil stability, increase sediment deposits, and alter channel morphology. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species.

Fish and Wildlife Management

This program aims to maintain biological diversity, improve habitat on for wildlife and fisheries, and provide habitats for threatened and endangered species.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), vegetation treatment or disturbance, and surface disturbance in potential western yellow-billed cuckoo habitat. Associated noise disturbances may cause avoidance of habitat. Vegetation disturbances or vegetation removal may adversely affect availability of nesting habitat, cover from predators, and insect prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species

Transportation and Access Management

The objectives of the transportation and access management program are to provide a safe and effective transportation and access system across public lands. Activities included under this program include maintenance of roads, support of counties and states for land access and road networks, reclamation of redundant and unused roads, management of scenic byway and backway corridors, and instillation of appropriate signage.

Activities occurring under this program may increase human presence, equipment and vehicle use (including associated noise disturbances), vegetation disturbance, and surface disturbance in yellow-billed cuckoo habitat. Vegetation disturbances or vegetation removal may decrease the availability and quality of nesting habitat; decrease cover from predators; and decrease the availability of prey habitat. Soil disturbances may increase erosion, adversely affect soil stability, and increase sediment deposits. Increased occurrence of invasive plants species may change the vegetation community and change the habitat for yellow-billed cuckoo and their prey species. Exchange or sales of lands may lead to habitat fragmentation and loss. As a result, there may be a decrease in the fitness of adults and nestlings, and potential western yellow-billed cuckoo habitat may become degraded and unable to support this species.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this conference opinion. Future

Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to candidate species western yellow-billed cuckoo under the Proposed Actions would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a species' suitable or potential habitat.
- Encroachment of human development into a species' suitable or potential habitat.
- Fire management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - State of Utah
    - County Governments in Utah
    - Local Governments in Utah
    - Private landholders in Utah

Western yellow-billed cuckoo have not been found in the planning area. However, small amounts potential and suitable habitat occurs within the jurisdictional management boundaries of BLM in the Price Field Office area. In these areas, western yellow-billed cuckoo habitat is surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Western yellow-billed cuckoo are susceptible to activities on State and private lands. Many of these activities, such as urban growth and development; construction and operation of dams along major waterways; water retention, diversion, or dewatering of springs, wetlands, or streams; recreation; road construction; fuels-reduction treatments; research; grazing activities (including alteration or clearing of native habitats for domestic animals); oil and gas exploration and development; introduction of non-native plant or wildlife species (which can alter native habitats and alter prey populations); and other associated actions. Increases or changes in cowbird foraging areas (construction of corrals, grazing of domestic stock, placement of bird feeders) and habitat fragmentation may increase the parasitism rate and prevent western yellow-billed cuckoo habitat use in the planning area. Increased recreation, camping, off-road vehicle use, and river trips may harass and disturb breeding birds or impact nesting habitats. Contributing as cumulative effects to the proposed action, these activities will continue to affect western yellow-billed cuckoo presence with disturbances to breeding, nesting, and foraging behaviors and habitat (including areas of designated critical habitat), and further fragmenting habitat.

Conclusion

The conclusions of this conference opinion are based on full implementation of the programs as described in the "Description of the Proposed Action" section of this document, including the conservation measures that were incorporated into the project design.

After reviewing the status of western yellow-billed cuckoo, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the USFWS's conference opinion that the Price BLM Field Office Resource Management Plan, as proposed, is not likely to contribute to listing of western yellow-billed cuckoo. We base our conclusion on the following:

1. The applicant committed resource protection measures will be incorporated into site-specific projects designed under the BLM Resource Management Plan. If project design cannot adhere to all applicant committed resource protection measures, consultation under Section 7 of the Endangered Species Act will be initiated.
2. All site-specific projects designed under the proposed BLM Resource Management Plan would be subject to consultation requirements under Section 7 of the Endangered Species Act.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act, as amended, prohibits take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). "Harass" is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3).

Actual take levels are unquantifiable because the PFO BLM Resource Management Plan implementation includes all possible projects authorized on all Price Field Office lands in Utah and may occur within threatened or endangered species' habitats. However, although unquantifiable, take may occur through harm and harassment. Therefore, in the event that the applicant committed Conservation Measures are not completely incorporated into project-specific design, or if site-specific characteristics may lead to effects not considered in this biological opinion, section 7 consultation will be reinitiated at the project-specific level.

No exemption from Section 9 of the Act is granted in this biological opinion. BLM's implementation of Resource Management Plans is likely to adversely affect listed species. The likelihood of incidental take, and the identification of reasonable and prudent measures and terms and conditions to minimize such take, will be addressed in project-level consultations. Levels of incidental take and measures to reduce such take cannot be effectively identified at the level of proposed action because of the broad geographic scope and time frame, and the lack of site specific information. Rather, incidental take and reasonable and prudent measures may be identified adequately through subsequent actions subject to section 7 consultations at the project-specific scale.

REASONABLE AND PRUDENT MEASURES / TERMS AND CONDITIONS

BLM coordinated and developed, with the U.S. Fish and Wildlife Service, species-specific conservation measures. These conservation measures were included as part of the Resource Management Plan project description. Therefore, the USFWS believes that additional Reasonable and Prudent Measures and Terms and Conditions will not be necessary in this programmatic opinion due the BLM's proactive initiation to minimize impacts on listed species. We commend BLM's efforts to conserve and protect threatened and endangered species. It is possible that additional reasonable and prudent measures and terms and conditions may be required on a project-specific level, in a tiered consultation to this programmatic opinion.

RECOMMENDED CONSERVATION MEASURES

The U.S. Fish and Wildlife Service recommends incorporating the following guidance into the Resource Management Plan to ensure successful management, protection, and recovery of listed species and their habitats at the landscape and site-specific levels. The USFWS understands that Recommended Measures are not always feasible or applicable for all projects. Available Recovery Plans, Conservation Agreements/Strategies, Scientific Literature, and other available information should consistently be applied to occupied, suitable, and potentially suitable habitats of listed species. The following recommendations should be used in conjunction with available species-specific plans and literature and appropriately applied at the landscape and site-specific planning levels in a manner that ensures conservation and recovery of listed and sensitive species. In general, these guidelines should apply to listed and sensitive species habitats in areas of known and likely occurrence, particularly where recovery and conservation objectives have been identified by available species-specific plans.

All Species

- Avoid land trades/disposals of listed and sensitive species habitats.
- Avoid the broad-scale use of pesticides and insecticides in habitats of listed species, during sensitive time periods such as breeding and nesting seasons.
- Avoid use of pesticides in riparian habitats and areas adjacent to riparian areas. If used, avoid drift and apply non-persistent pesticides with low bioaccumulation potential.
- Encourage management that maintains sagebrush ecological sites.
- Avoid practices that permanently convert sagebrush shrubland to nonnative grassland.
- Implement management strategies that maintain or improve degraded riparian communities; protect natural flow requirements; protect water quality; manage for stable non-eroding banks; and manage for year-round flows.
- Manage riparian areas from a watershed perspective. Ensure that riparian areas within the project are as continuous as possible along the entire drainage and are as wide as the soil and water table will allow riparian vegetation to exist.

- Manage riparian areas to ensure a multi-aged, multi-layered structure, allowing for retention of snags and diseased trees. Provide multiple layers of vegetation (vertical structure) within 10 feet of the ground.
- Enhance the protection of wetland functions by emphasizing the protection of natural wetland structure, composition, and ecological processes.
- Establish appropriate buffers between wetlands and incompatible land uses adequate to preserve the functional integrity of the wetlands.
- Discourage development of natural water sources under BLM's management.
- When considering spring development/redevelopment, evaluate springs for occurrence of flora and fauna, with particular focus on detecting rare or unique species. Maintain sufficient water to sustain native flora and fauna. Return unused or overflow water to its original drainage. Protect the spring source area from detrimental impacts, e.g. from livestock, recreationists. Protect the spring source from risk of degradation of water quality.
- Fully mitigate all unavoidable habitat losses for listed and migratory birds, at a suggested ratio of 1:1. Mitigate all unavoidable riparian losses at a suggested ratio of 2:1. This ratio may be increased if mitigation does not occur prior to disturbance, if replacement habitat is less valuable than lost habitat, if habitat fragmentation is causing broad-scale impacts to remaining available habitats, or other reasons. Both direct and indirect habitat losses will be considered and fully mitigated.
- Include native forbs and grasses in seeding mixtures where feasible.
- Monitor condition of habitat in occupied, suitable, or potentially suitable habitat for listed and sensitive species to ensure maintenance of good to excellent ecological conditions; restoration and conservation of good to excellent aquatic habitat conditions; and consistent with available species-specific habitat requirements.
- Consider wildlife use when designing spring exclosures.
- If water developments occur, divert water several hundred feet downstream of the water source to allow wildlife to benefit, hydric species to perpetuate, and water quality to remain high.
- Limit the amount of time livestock spend in pastures with riparian areas; base grazing seasons/length on condition of riparian vegetation.
- Maintain or modify existing grazing regimes to promote growth of desirable vegetation and maintain desirable understory vegetation. Temporarily remove grazing from degraded habitats and habitats recovering from fire and other disturbances.
- Manage grazing to maintain riparian habitats with all desirable vegetation structure and age classes.
- Avoid construction or expansion of recreation facilities within occupied, suitable, and potentially suitable habitat for listed and sensitive species.

- Limit the number of new roadways in project areas when possible to protect wildlife and plant resources. Decommission unnecessary roads and reclaim unauthorized illegal trails in habitats important to listed and sensitive species.
- Where appropriate at designated recreation sites, design recreation activities that are predictable for wildlife; i.e. provide well-marked trails or boardwalks to encourage controlled and predictable human use away from listed and sensitive species habitats, and discourage off-trail hiking and creation of alternate routes.
- Avoid constructing new trails along or parallel to riparian areas.
- Reduce or restrict recreational uses including, but not limited to, all-terrain vehicles, bicycles, horses, birdwatchers, and hikers in riparian areas.
- Where recreation conflicts with use by listed and sensitive species, and area closures are not practical, provide on-site monitoring to educate users and control use.
- Sponsor programs and post signs that educate users about the value of riparian habitat to listed and sensitive species.
- Provide interpretive site and literature on recognition and value of protecting biological soil crusts at major access points in areas of extensive or unique crust formation.
- Avoid building new roads and trails in riparian areas, and avoid stream crossings.
- Close affected watersheds and/or riparian areas to livestock grazing for one or more years to allow for recovery of riparian vegetation. The appropriate length of time for closure to grazing will depend on site-specific characteristics.
- Avoid or restrict mineral development activities in riparian habitats.
- Disturbances of all suitable habitats for listed and sensitive species will be improved to provide adequate habitat (pre-disturbance condition or better).

Yellow-billed cuckoo

- Avoid destruction of existing native cottonwood-willow dominated riparian forests and restore riparian habitats where possible.
- Eliminate loss of dense shrub layers in existing riparian areas and restore shrub areas where absent, when ecologically appropriate.
- Closely monitor grazing, recreational, and other impacts on cottonwood and willow seedlings in riparian systems and reduce or remove sources when seedlings are being impacted.
- Avoid habitat altering activities in riparian areas.

Mexican spotted owl

- Consider seasonal (March 1 – August 31) and spatial (0.5 mile) closures for recreational activities within PAC areas and suitable owl habitats.

- Maintenance of existing facilities within occupied (including PACs) and suitable Mexican spotted owl habitats should be avoided during the breeding season (March 1 – August 31).
- Implement recreational restrictions that protect occupied (including PACs) and suitable Mexican spotted owl habitats. Include these restrictions as part of all special recreation permits. Examples include, but are not limited to group size limits, length of stay, allowed use areas.
- Avoid road or trail building within PACs.
- Assess the presence and intensity of recreational activities in PACs, and apply appropriate measures to minimize impacts to the Mexican spotted owl and its habitat, in accordance with Recovery Plan recommendation and best available scientific information.
- Limit OHV and Guided Vehicle Tour uses to designated road and trails in Mexican spotted owl habitat and PACs.
- Conduct pre- and post-monitoring of Mexican spotted owl habitat conditions in PAC areas for surface disturbing activities.

Southwestern willow flycatcher

- Provide that areas of stop over and potentially suitable habitat the southwestern willow flycatcher are protected from impacts associated with recreational use; i.e. confine camping areas, restore impacted habitats, minimize attractants to scavengers, predators, and brown-headed cowbirds as appropriate.
- Minimize noise disturbance near suitable and potentially suitable southwestern willow flycatcher habitat. Measures may include, but are not limited to, rerouting trails and day use areas away from habitats, controlling the number of visitors, and discouraging use of loud equipment near breeding locations.
- Restore or maintain perennial surface flows and shallow groundwater in suitable southwestern willow flycatcher habitats, and areas targeted for restoration of suitable habitat.
- Avoid habitat altering activities in riparian areas.
- Unavoidable disturbances of riparian habitats suitable for southwestern willow flycatchers will be restored (pre-disturbance conditions or better) to provided adequate habitat for the species.

Plants

- Avoid use of aerosol insecticides within 3 miles of listed plant populations to protect pollinators.
- Direct recreational activities away from occupied habitats of listed and sensitive plant species.

Colorado Fish Species

- Implement INFISH standards or other appropriate methodologies based on soil and terrain conditions, to provide riparian functions, including delivery of organic matter and woody debris, stream shading, and bank stability.
- In accordance with INFISH, no disturbance should occur within a buffer zone of 300' on each side of perennial fish bearing streams, 150' on each side of perennial non-fish bearing streams, and between 50' - 100' on each side of intermittent streams.
- Encourage activities to eliminate competing nonnative species and discourage any introduction of nonnative species into aquatic systems.
- Allow for translocations, fish control and removal, transfers, and other movement of fish for conservation and recovery of the species.
- Implement management strategies to restore fish passage, restore and retain natural hydrograph and hydrology, restore and ensure an appropriate distribution of aquatic habitats with special attention to native aquatic species, and restore and protect natural stream processes and function.
- In watersheds that are adjacent to the Colorado, Green, and White Rivers (and their important tributaries), and within major seleniferous formations (e.g., Mancos Shale and Duchesne), manage biological soil crusts to reduce erosion of selenium-bearing soils to habitat for endangered Colorado River fish.
- Provide resource protection measures associated with fishing access, i.e. provide well-marked trails or boardwalks to encourage controlled and predictable human use and discourage off-trail hiking and creation of alternate routes particularly in riparian areas.
- Implement INFISH standards (i.e., riparian buffers), or other appropriate methodologies based on soil and terrain conditions, to provide riparian functions, including delivery of organic matter and woody debris, stream shading, and bank stability.
- Avoid construction of fire lines using mechanized equipment so that they cross stream channels or terminate at the stream channel.
- Avoid mixing or applying fire suppressant chemicals (i.e. surfactant foam or retardant formulations) within 300 feet of the stream channel, except when a threat to human life or property exists.
- Avoid transferring water from one watershed into another for the purpose of water drops, as this may aid in spread of water-borne diseases such as whirling disease.
- Manage fire regimens (prescribe and wild) to protect or improve riparian and flood plain habitats.
- Pipeline crossings of perennial, intermittent, and ephemeral stream channels should be constructed to withstand floods of extreme magnitude to prevent breakage and subsequent accidental contamination of runoff during high flow events.

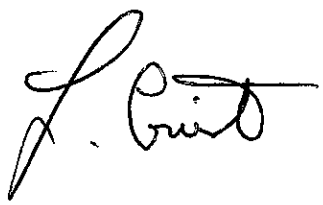
- Surface crossings must be constructed high enough to remain above the highest possible stream flows at each crossing, and subsurface crossings must be buried deep enough to remain undisturbed by scour throughout passage of the peak flow.
- To avoid repeated maintenance of pipeline crossings, hydraulic analysis should be completed in the design phase to eliminate costly repair and potential environmental degradation associated with pipeline breaks at stream crossings

RE-INITIATION STATEMENT

This is a program-level document that does not include project specific detail for actions authorized by the Resource Management Plan. Additional consultation with USFWS will be necessary for any authorized project specific action that may impact any listed species.

This concludes formal consultation on the Price BLM Field Office Resource Management Plan. As provided in 50 CFR §402.16, re-initiation of formal consultation is required if: 1) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this opinion, 2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion, 3) a new species is listed or critical habitat designated that may be affected by the action, 4) a project proposing biological control measures is proposed or 5) water depletions are expected to occur.

Thank you for your interest in conserving threatened and endangered species. If we can be of further assistance, please contact Katherine Richardson at (801) 975-3330 ext. 125 or Laura Romin at ext. 123.



LITERATURE CITED

Mexican spotted owl

American Ornithologists' Union. 1957. Checklist of North American birds. Fifth ed. Am. Ornithologists' Union, Washington, D.C. 691pp.

Delaney, D. K., T. G. Grubb, and L. L. Pater. 1997. Effects of helicopter noise on nesting Mexican spotted owls. A report to the U.S. Air Force 49 CES/CEV, Holloman Air Force Base. Project Order No. CE P. O. 95-4. 49 pp.

Earhart, C. M., and N. K. Johnson. 1970. Size dimorphism and food habits of North American owls. Condor 72:251-264.

Fletcher, K. W. and H. E. Hollis. 1994. Habitats used, abundance, and distribution of the Mexican spotted owl (*Strix occidentalis lucida*) on National Forest System lands in the southwestern region. USDA Forest Service, Southwestern Region, Albuquerque, New Mexico.

Forsman, E. D., E. C. Meslow, and M. J. Strub. 1976. Spotted owl abundance in second-growth versus old-growth forest. Bulletin of the Wildlife Society of Washington. 5(2): 43-47.

Forsman, E. D. 1981. Molt of the Spotted Owl. Auk 98:735-742.

Forsman, E. D., E. C. Meslow, and H. M. Wight. 1984. Distribution and biology of the spotted owl in Oregon. Wildlife Monographs No. 87. 64 pp.

Ganey, J. L. 1988. Distribution and habitat ecology of the Mexican spotted owls in Arizona. M.S. Thesis Northern Arizona University, Flagstaff, Arizona. 229 pp.

Ganey, J. L., and R. P. Balda. 1989. Distribution and habitat use of Mexican spotted owls in Arizona. Condor 91:355-361.

Ganey, J. L., and R. P. Balda. 1994. Habitat selection by Mexican spotted owls in northern Arizona. Auk 111:162-169.

Ganey, J. L. and W. M. Block. 2005. Winter movements and range use of radio-marked Mexican spotted owls: an evaluation of current management recommendations. Gen. Tech. Rep. RMRS-GTR-148-WWW. Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 9 p.

Ganey, J. L., G. C. White, A. B. Franklin, J. P. Ward, Jr., and D. C. Bowden. 2000. A pilot study on monitoring populations of Mexican spotted owls in Arizona and New Mexico: second interim report. 41 pp.

Gutierrez, R. J. and S. E. Rinkevich. 1991. Final Report Distribution and Abundance of Spotted Owls in Zion National Park, 1991, National Park System Order No. PX-1200-9-C820.

Gutierrez, R. J., C. A. May, M. L. Peterson, M. E. Seamans. 2003. Temporal and spatial variation in the demographic rates of two Mexican spotted owl populations. Final Report, submitted to USDA, Rocky Mountain Research Station, Fort Collins, Colorado. 146 pp.

Hammitt, W. E. and D. N. Cole. 1987. Wildland recreation: ecology and management. John Wiley and Sons, New York. 341 pp.

Johnsgard, P. A. 1988. North American owls: Biology and natural history. Smithsonian Institution Press, Washington D.C.

Moen, C. A., A. B. Franklin, and R. J. Gutierrez. 1991. Age determination of subadult northern spotted owls in northwest California. Wildlife Society Bulletin. 19:489-493.

Rinkevich, S. E. 1991. Distribution and habitat characteristics of Mexican spotted owls in Zion National Park, Utah. M.S. Thesis. Humboldt State University, Arcata, California. 62pp.

Seamans M. E., R. J. Gutiérrez, C. A. May, M.Z. Peery. 1999. Demography of two Mexican spotted owl populations. Conservation Biology. 13:744–754.

Skaggs, R. W., and R. J. Raitt. 1988. A Spotted Owl inventory on the Lincoln National Forest Sacramento Division: 1988. Contract No. 5-5 16.6-76-17. New Mexico Department of Game and Fish. Santa Fe, New Mexico.

Thomas, J. W., M. G. Raphael, R.G. Anthony, E. D. Forsman, A. G. Gunderson, R.S. Holthausen, B. G. Marcot, G. H. Reeves, J. R. Sedell, and D. M. Solis. 1993. Viability assessments and management considerations for species associated with late-successional and old-growth forests of the Pacific Northwest. USDA Forest Service, Portland, Oregon. 529 pp.

U.S. Fish and Wildlife Service (USFWS). 1993. Endangered and Threatened Wildlife and Plants; final rule to list the Mexican spotted owl as threatened. Federal Register 58(49):14248-14271. March 16, 1993.

U.S. Fish and Wildlife Service (USFWS). 1995. Recovery Plan for the Mexican Spotted Owl. Albuquerque, New Mexico.

U.S. Fish and Wildlife Service (USFWS). 2004. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Mexican Spotted Owl. Federal Register 69 (168): 53181-53298; August 31, 2004.

Utah Division of Wildlife Resources (UDWR). 2003. http://dwrcdc.nr.utah.gov/ucdc/

Verner, J., K. S. McKelvey, B. R. Noon, R. J. Gutierrez, G. I. Gould, Jr., and T. W. Beck, eds. 1992. The California spotted owl: a technical assessment of its current status. USDA Forest Service General Technical Report PSW-133. 285 pp.

Walker, L. W. 1974. The book of owls. Alfred A. Knopf, New York, N.Y 255 pp.

White G. C., A. B. Franklin, J. P. Ward Jr. 1995. Population biology. *In*: United States Department of Interior, Fish and Wildlife Service. Recovery Plan for the Mexican spotted owl (*Strix occidentalis lucida*), volume II. Technical supporting information. Chapter 2:1–25. United States Fish and Wildlife Service, Albuquerque, New Mexico. (Available at http://mso.fws.gov/recovery-plan.htm).

Willey, D. W. 1993. Home-range characteristics and juvenile dispersal ecology of Mexican spotted owls in southern Utah. Unpublished Report. Utah Division Wildlife Resources, Salt Lake City, Utah.

Willey, D. W. 1995. Mexican spotted owls in canyonlands of the Colorado Plateau. *Pp. 330-331 In:* LaRoe, E. T., Farris, G. S., Puckett, C. E., Doran, P. D. and Mac, M. J., editors. *Our living resources: A report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems.* U.S. Department of the Interior, National Biological Service, Washington, D.C.

Willey, D. W. 1998. Movements and habitat utilization by Mexican spotted owls within the canyon lands of Utah. PhD Thesis. Northern Arizona University. 87pp.

Willey, D. W. and D. Spotskey. 1997. Unpublished GIS model for Mexican spotted owl breeding habitat. Final Report; Arizona Heritage Program, Phoenix, Arizona.

Willey, D. W. and D. Spotskey. 2000. Field test of a habitat model for Mexican spotted owl breeding habitat. Final Report; Arizona Heritage Program, Phoenix, Arizona.

Southwestern willow flycatcher

Anderson, B. W., A. Higgins, and R. D. Ohmart. 1977. Avian use of saltcedar communities in the lower Colorado River Valley. *In:* Johnson RR, Jones DA (tech. coord.), Proc. Symp. The importance, preservation and management of riparian habitat, July 9, 1977, Tucson, Arizona. USDA Forest Service Rocky Mountain Forest Range Experiment Station, Fort Collins, Colorado. General Technical Report RM-43, pp. 128-136.

Behle, W. H., Bushman, and C. M. Greenhalgh. 1958. Birds of the Price area and adjacent high plateaus of southern Utah. University of Utah Biological Service. 11:1-92.

Behle, W. H. and H. G. Higgins. 1959. The birds of Glen Canyon. *In:* Ecological Studies of Flora and Fauna in Glen Canyon (A.M. Woodbury, ed.) University Utah Anthropol. Pap. 40 (Glen Canyon Series No. 7), pp 107-133.

Behle, W. H. 1985. Utah Birds: Geographic Distribution and Systematics: Occasional Publication, no. 5. Utah Museum of Natural History, University of Utah, Salt Lake City.

Browning, M. R. 1993. Comments on the taxonomy of *Empidonax traillii* (willow flycatcher). Western Birds 24:241-257.

Christensen, E. M. 1962. The rate of naturalization of *Tamarix* in Utah. American Midland Naturalist 68:51-57.

Finch, M. F., J. F. Kelly, and J. E. Cartron. 2000. Migration and Winter Ecology. Chapter 7 *In* D. Finch and S. Stoleson, eds. Status, Ecology and Conservation of the Southwestern Willow Flycatcher. USDA Forest Service General Technical Report RMRS-GTR-60.

DeLoach, C. J. 1991. Saltcedar, an exotic weed of western North American riparian areas: A review of its taxonomy, biology, harmful and beneficial values, and its potential for biological control. Report to the Bureau of Reclamation, Boulder City, Nevada.

Durst, S. L., M. K. Sogge, H. C. English, S. O. Williams III, B. E. Kus, S. J. Sferra. 2004. Southwestern willow flycatcher breeding site and territory summary – 2004. U. S. Geological Survey, Southwest Biological Science Center, Colorado Plateau Research Station. Flagstaff, Arizona. 18 pp.

Graf, W. L. 1982. Tamarisk and river-channel management. Environmental Management 6:283-296.

Horton, J. S. 1977. The development and perpetuation of the permanent tamarisk type in the phreatophyte zone of the southwest. Contributed paper, Symposium on the Importance, Preservation and Management of the Riparian Habitat, July 9, 1977, Tucson, Arizona. pp 124-127.

Howell, S. N. G. and S. Webb. 1995. A Guide to the Birds of Mexico and Northern Central America. Oxford University Press. 851 pp.

Hubbard, J. P. 1987. The status of the Willow flycatcher in New Mexico. Endangered Species Program, New Mexico Dept. Of Game and Fish, Santa Fe, New Mexico. 29 pp.

Johnson, M. J. and C. O'Brien. 1998. Southwestern willow flycatcher and yellow-billed cuckoo surveys along the San Juan River, Utah (Four Corners Bridge - Mexican Hat): 1998. Final Report to the Utah Division of Wildlife Resources (Contract # 976475). Colorado Plateau Field Station/Northern Arizona University report. 45 pp.

Johnson, M. J. 1998. Southwestern willow flycatcher surveys in the Manti-La Sal National Forest, (Moab and Monticello Districts) Utah: 1998. Final report to the Utah Division of Wildlife Resources. USGS Biological Resources Division, Forest and Rangeland Ecosystem Science Center, Colorado Plateau Field Station, Northern Arizona University report, Flagstaff, Arizona. 19 pp.

Johnson, M. J., A. Brand, H. C. English, C. Michaud, and B. Moore. 1999a. Southwestern Willow Flycatcher and Western Yellow-billed Cuckoo Surveys along the Colorado River (Dewey Bridge - Canyonlands National Park Northern Boundary) and Green River, UT - Canyonlands National Park Northern Boundary) 1999. U.S. Geological Survey report to the U.S. Bureau of Reclamation and the Utah Department of Natural Resources.

Johnson, M. J., A. Brand, H. C. English, C. Michaud, and B. Moore. 1999b. Southwestern Willow Flycatcher and Western Yellow-billed Cuckoo Surveys in the Canyonlands National Park along the Colorado and Green Rivers, 1999. U.S. Geological Survey report to the U.S. Bureau of Reclamation and the Utah Department of Wildlife Resources.

Langridge, S. M. and M. K. Sogge. 1998. Banding and genetic sampling of willow flycatcher in Utah: 1997 and 1998. U.S.G.S. Colorado Plateau Field Station/Northern Arizona University report. 60 pp.

McCarthey, T.D., C.E. Paradzick, J.W. Rourke, M.W. Sumner, and R.F. Davidson. 1998. Arizona Partners In Flight southwestern willow flycatcher 1997 survey and nest monitoring report. Nongame and Endangered Wildlife Program Technical Report 130. Arizona Game and Fish Department, Phoenix, Arizona.

Owen, J. C. and M. K. Sogge. 2002. Physiological condition of southwestern willow flycatchers in native and saltcedar habitats. U.S. Geological Survey report to the Arizona Department of Transportation and access, Phoenix, Arizona.

Paxton, E. H. 2000. Molecular Genetic Structuring and Demographic History of the Willow Flycatcher (*Empidonax traillii*). A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Biology. Northern Arizona University, May 2000.

Paxton, E., J. J. Owen, and M.K. Sogge. 1996. Southwestern willow flycatcher response to catastrophic habitat loss. Colorado Plateau Research Station. U. S. Geological Survey Biological Resources Division. Northern Arizona University, Flagstaff, Arizona. 12 pp.

Phillips, A. R. 1948. Geographic variation in Empidonax traillii. Auk 65:507-514.

Phillips, A. R., J. Marshall, and G. Monson. 1964. The Birds of Arizona. University of Arizona Press, Tucson, Arizona. 212 pp.

Ridgely, R. S. and G. Tudor. 1994. The Birds of South America. Volume II: The Suboscine Passerines. University of Texas Press, Austin, Texas. 814 pp.

Schreier, W. 1996. Bryce Canyon National Park 1996 Federal Endangered Avian Species Survey Report: Southwestern Willow Flycatcher. Colorado Plateau System Support Office, Intermountain Field Area, National Park Service: Bryce Canyon, Utah.

Sedgwick, J. A. 1998. Regional Variability in the Song of the Southwestern Willow Flycatcher. Draft report to the Arizona Game and Fish Department. USGS Biological Resources Division, Midcontinent Research Station, Fort Collins, CO. 15 pp. plus appendices.

Sedgwick, J. A. 2001. Geographic variation in the song of willow flycatchers: differentiation between *Empidonax traillii adastus* and *E. t. extimus*. Auk 118(2):366-379, 2001.

Sferra, S.J., T.E. Corman, C.E. Paradzick, J.W. Rourke, J.A. Spencer, and M.W. Sumner. 1997. Arizona Partners In Flight southwestern willow flycatcher survey: 1993-1996 summary report. Nongame and Endangered Wildlife Program Technical Report 113. Arizona Game and Fish Department, Phoenix, Arizona.

Sogge, M. K. 2000. Breeding Season Ecology. Chapter 6 *In* D. Finch and S. Stoleson, eds. Status, Ecology and Conservation of the Southwestern Willow Flycatcher. USDA Forest Service General Technical Report RMRS-GTR-60.

Sogge, M. K., R. M. Marshall, S. J. Sferra, and T. J. Tibbitts. 1997. A Southwestern Willow Flycatcher Natural History Summary and Survey Protocol. Technical Report NPS/NAUCPRS/NRTR-97/12.

Sogge, M. K. and R. M. Marshall. 2000. A survey of current breeding habitats. Chapter 9 *In* D. Finch and S. Stoleson, eds. Status, Ecology and Conservation of the Southwestern Willow Flycatcher. USDA Forest Service General Technical Report RMRS-GTR-60.

Sogge, M. K., S. J. Sferra, T. D. McCarthey, S. O. Williams, and B. E. Kus. 2003. Distribution and characteristics of Southwestern Willow Flycatcher Breeding Sites and Territories. Studies in Avian Biology 26:5-11.

Sogge, M. K. and T. J. Tibbits. 1994. Distribution and Status of the Southwestern Willow Flycatcher along the Colorado River in the Grand Canyon - 1994. Summary Report. National Biological Service Colorado Plateau Research Station/Northern Arizona University and U.S. Fish and Wildlife Service. 37 pp.

Stiles, F. G. and A. F. Skutch. 1989. A Guide to the Birds of Costa Rica. Cornell University Press, New York.

Travis, J. R. 1996. Song Types of Willow Flycatchers in New Mexico. Contract No. 95-516-67. Endangered Species Program, New Mexico Department of Game and Fish, Santa Fe, New Mexico. 31 pp.

Unitt, P. 1987. *Empidonax traillii extimus*: An endangered subspecies. Western Birds 18:137-162.

Unitt, P. 1997. Winter range of *Empidonax traillii extimus* as documented by existing museum collections. Report to the U.S. Bureau of Reclamation, Phoenix, Arizona.

U.S. Fish and Wildlife Service (USFWS). 1995. Final rule determining endangered status for the southwestern willow flycatcher (*Empidonax traillii extimus*). February 27, 1995. Federal Register 60:10694.

U.S. Fish and Wildlife Service (USFWS). 1997. Final determination of critical habitat for the southwestern willow flycatcher. July 22, 1997. Federal Register 62(140):39129-39146.

U.S. Fish and Wildlife Service (USFWS). 2001. Southwestern Willow Flycatcher Recovery Plan. Albuquerque, New Mexico. Prepared by Southwestern Willow Flycatcher Recovery Team Technical Subgroup.

U.S. Fish and Wildlife Service (USFWS). 2002. Final Recovery Plan Southwestern Willow Flycatcher. Albuquerque, New Mexico. Prepared by Southwestern Willow Flycatcher Recovery Team Technical Subgroup.

U.S. Fish and Wildlife Service (USFWS). 2003. Final Recovery Plan Southwestern Willow Flycatcher. Albuquerque, New Mexico. Prepared by Southwestern Willow Flycatcher Recovery Team Technical Subgroup.

U.S. Fish and Wildlife Service (USFWS). 2005. Designation of Critical Habitat for Southwestern willow flycatcher, Final Rule. October 19, 2005. Federal Register 70(201):60886-61009.

Wauer, R. H. and D. L. Carter. 1965. Birds of Zion National Park and vicinity. Zion Natural History Association, Springdale, Utah. 92 pp.

Whitfield, M.J. 1990. Willow flycatcher reproductive response to brown-headed cowbird parasitism. Masters Thesis, California State University, Chico, California. 25 pp.

Whitfield, M. J. and C. M. Strong. 1995. A Brown-headed cowbird control program and monitoring for the Southwestern Willow Flycatcher, South Fork Kern River, California, 1995. California Department of Fish and Game, Sacramento. Bird and Mammal Conservation Program Report 95-4.

Whitfield, M. J. and K. M. Enos. 1996. A Brown-headed cowbird control program and monitoring for the Southwestern Willow Flycatcher, South Fork Kern River, California, 1996. California Department of Fish and Game, Sacramento, California. Final report for contract #FG4100WM-1.

Yong, W. and D. M. Finch. 1997. Migration of the Willow Flycatcher along the Middle Rio Grande. Wilson Bulletin 109:253-268.

San Rafael cactus

Cronquist, A., A.H. Holmgren, N.H. Holmgren, and L.L. Reveal. 1972. Intermountain Flora. Volume 1. New York: Hafner Publishing House.

Heil, K. 1984. Status report on *Pediocactus despainii*. U.S. Fish and Wildlife Service, Denver, Colorado. 14 pp.

Heil, K., B. Armstrong, and D. Schleser. 1981. A review of the genus *Pediocactus*. Cactus & Succulent Journal 53: 17-39.

The Nature Conservancy. 1998. San Rafael Cactus (*Pediocactus despainii*). Natural Heritage Central Databases (NHCD) information provided via the Biodiversity Conservation Data Source (BioSource) website.

USDA et al. 1998. U.S. Department of Agriculture - Forest Service, U.S. Department of Interior - Bureau of Land Management, U.S. Department of Interior - National Park Service, U.S. Department of Interior – Fish and Wildlife Service, Utah Department of Natural Resources, Emery County (Utah), and Wayne County (Utah). 1998. *Pediocactus winkleri* (Winkler Cactus) and *Pediocactus despainii* (San Rafael Cactus) Draft Conservation Agreement and Strategy. 37 pp.

U.S. Fish and Wildlife Service (USFWS). 1987. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for *Pediocactus despainii* (San Rafael Cactus). Federal Register Vol. 52, (179): 34914-34917.

U.S. Fish and Wildlife Service (USFWS). 1995. Informal Interagency Conference for Impacts to the Winkler Cactus from the Development of the Last Chance Bentonite Mine. Memo to Penelope Dunn, Area Manager, San Rafael Resource Area, Bureau of Land Management, Price, Utah. U.S. Fish and Wildlife Service, Ecological Services, Salt Lake City, Utah.

U.S. Fish and Wildlife Service (USFWS). 1998. Endangered and Threatened Wildlife and Plants; Final Rule to Determine the Plant *Pediocactus winkleri* (Winkler Cactus) To Be a Threatened Species. Federal Register Vol. 63, (161): 44587-44595.

Walter, K. S. and H. J. Gillett, eds. 1998. 1997 IUCN Red List of Threatened Plants. Compiled by the World Conservation Monitoring Center. IUCN - The World Conservation Union, Gland, Switzerland. lxiv + 862 pp.

Welsh , S. L. and S. Goodrich. 1980. Welsh, S.L. and S. Goodrich, miscellaneous plant novelties from Alaska, Nevada, and Utah. Great Basin Naturalist 40: 78-88.

Welsh, S. L., N. D. Atwood, S. Goodrich, and L. C. Higgins, 1993. A Utah Flora, Second Edition. Brigham Young University Press, Provo, Utah. 986 + vii pp.

Winkler cactus

England, L. 1997. *Pediocactus winkleri.* Status Report Supplement Number 2. May 30, 1997. U.S. Fish and Wildlife Service, Salt Lake City, Utah.

Heil, K. D. 1979. Three new species of Cactaceae from southeastern Utah. Cactus and Succulent Journal of America 51:25-30.

Neese Investigation. 1987. Habitat inventory of *Sclerocactus wrightiae* and other associated sensitive species. Prepared for the Bureau of Land Management.

Porter, M. J., E. H. Roalson, and K. D. Heil. 1999. Population structure in *Pediocactus winkleri* and *P. despainii* (Cactaceae), based on chloroplast haplotypes, inferred from trnL-F DAN sequences. Draft document.

USDA et al. 1998. U.S. Department of Agriculture - Forest Service, U.S. Department of Interior - Bureau of Land Management, U.S. Department of Interior - National Park Service, U.S. Department of Interior – Fish and Wildlife Service, Utah Department of Natural Resources, Emery County (Utah), and Wayne County (Utah). 1998. *Pediocactus winkleri* (Winkler Cactus) and *Pediocactus despainii* (San Rafael Cactus) Draft Conservation Agreement and Strategy. 37 pp.

U.S. Fish and Wildlife Service (USFWS). 1987. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for *Pediocactus despainii* (San Rafael Cactus). Federal Register Vol. 52, (179): 34914-34917.

U.S. Fish and Wildlife Service (USFWS). 1995. Informal Interagency Conference for Impacts to the Winkler Cactus from the Development of the Last Chance Bentonite Mine. Memo to Penelope Dunn, Area Manager, San Rafael Resource Area, Bureau of Land Management, Price, Utah. U.S. Fish and Wildlife Service, Ecological Services, Salt Lake City, Utah.

U.S. Fish and Wildlife Service (USFWS). 1998. Endangered and Threatened Wildlife and Plants; Final Rule to Determine the Plant *Pediocactus winkleri* (Winkler Cactus) To Be a Threatened Species. Federal Register Vol. 63, (161): 44587-44595.

Welsh, S. L., N. D. Atwood, S. Goodrich, and L. C. Higgins, 1993. A Utah Flora, Second Edition. Brigham Young University Press, Provo, Utah. 986 pp.

Wright Fishhook Cactus

Benson, L. 1982. The Cacti of the United States and Canada. Stanford University Press. 1044 pp.

Bureau of Land Management. 1979. Field Records, BLM Inventory, Emery County, Utah.

Clark, D. J. 2002. Summary of the Interagency Rare Plant Inventory Project, 1999 through 2002. Prepared by Deborah J. Clark in cooperation with: Dixie National Forest, Teasdale, Utah; Capitol Reef National Park, Torrey, Utah; Bureau of Land Management, Price Field Office, Price, Utah; and Fishlake National Forest, Price, Utah.

Clark, D. J. and C. M. Groebner. 2003. Summary of Survey Results for Wright's Fishhook Cactus 2000 through 2003. (*Sclerocactus wrightiae*). Prepared for Bureau of Land Management, Price Field Office, Price, Utah. Prepared by Deborah J. Clark and Christine M. Groebner.

Christiansen, V. A., Jr. 1991. Staff Report, BLM, Henry Mountain Resource Area, Hanksville, Utah. Subject: Missing Wright's Fishhook Cactus (*Sclerocactus wrightiae*).

Cronquist, A., A. H. Holmgren, N. H. Holmgren, and J. L. Reveal. 1972. Intermountain Flora: Vascular Plant of the Intermountain West, U.S.A. Volume one. New York: Hafner Publishing Co. 270 p.

Groebner, C. M., G. L. Lenhart, and C. L. Craig. 2004. Survey results for Wright's Fishhook Cactus 2004. (*Sclerocactus wrightiae*). Prepared for Bureau of Land Management, Price Field Office, Price, Utah.

Heil, K. D. and J. M. Porter. 1994. *Sclerocactus* (Cactaceae): A Revision. Haseltonia: Yearbook of the Cactus and Succulent Society of America, No. 2.

Intermountain Ecosystems. 1999. Demographic Monitoring of Wright Fishhook Cactus (*Sclerocactus wrightiae*) Benson. 1993-1999. Prepared for Bureau of Land Management, Price District Office, Price, Utah. Prepared by Intermountain Ecosystems, LLC., Springville, Utah. Dated 13 December 1999.

Kass, R. J. [no date]. Demographic Monitoring of Wright Fishhook Cactus (*Sclerocactus wrightiae*) Benson. Prepared by Ronald J. Kass, Intermountain Ecosystem, LLC., Springville, Utah.

Kass, R. J. 1990. Final Report. Habitat Inventory of Threatened and Endangered and Candidate Species in the San Rafael Swell, Utah. U.S. Department of Interior, Bureau of Land Management, Salt Lake City, Utah. 87 pp.

Kass, R. J. 2001. Mortality of the Endangered Wright Fishhook Cactus (*Sclerocactus wrightiae*) Benson. Prepared by Ronald J. Kass, Intermountain Ecosystems, LLC., Springville, Utah.

Mathew, B. (ed). 1994. CITES Guide to Plant in Trade. CITES Department of Environment.

Neese Investigations. 1987. Final Report, Habitat Inventory of *Sclerocactus Wrightiae* and Other Associated Sensitive Species. Volume II – Record of Area Inventoried. Prepared for BLM, Price District Office, Price, Utah. Prepared by Neese Investigations, Salt Lake City, Utah.

Tepedino, V. J. 2000. The reproductive biology of rare rangeland plants and their vulnerability to insecticides; *In* Vol. III.5, pp1-10; Grasshopper Integrated Pest Management User Handbook, G. L. Cunningham & M. W. Sampson (Tech. Coord.) USDA APHIS Technical Bulletin No. 1809, Washington, D.C.

U.S. Fish and Wildlife Service (USFWS). 1985. Wright Fishhook Cactus Recovery Plan. Prepared in cooperation with the Wright Fishhook Cactus Recovery Committee. USFWS, Denver, Colorado. 27 pp.

U.S. Fish and Wildlife Service (USFWS). 2005. Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to Delist *Sclerocactus wrightiae* (Wright Fishhook Cactus) and Initiation of a 5-Year Status Review. Federal Register Vol. 70, No. 148, pages 44544-44547.

U.S. Fish and Wildlife Service (USFWS). 2008. Endangered and Threatened Wildlife and Plants; 5-Year Status Review.

Last Chance townsendia

Armstrong, L. and K. H. Thorne. 1991. Challenge cost share report, target species: *Townsendia aprica* Welsh & Reveal. Unpublished report, Bureau of Land Management, Salt Lake City, Utah. 14 pp + appendices.

Center for Plant Conservation (CPC). 2005. CPC National Conservation Plant Profile: *Townsendia aprica.* Website: http://www.centePFOrplantconservation.org/

Heil, K. 1987. A vegetation study of Capitol Reef National Park. Unpublished report, National Park Service, Torrey, Utah. 37 pp.

Kass, R. J. 1990. Final report of habitat inventoried of threatened, endangered and candidate plant species in the San Rafael Swell, Utah. Unpublished report, Bureau of Land Management, Salt Lake City, Utah. 87 pp.

Neese, E. 1987. Habitat inventory of *Sclerocactus wrightiae* and other associated sensitive species. Bureau of Land Management, Price, Utah. 119 pp.

Robinson, M. 2002. Unpublished BLM Challenge Cost Share. Status Report on *Townsendia aprica.*

Robinson, M. 2007. Unpublished BLM Challenge Cost Share. Status Report on *Townsendia aprica.*

Tepedino, V. T. and T. L. Griswold. 1991. USDA-ARS Bee Biology and Systematics Laboratory, Logan, Utah, personal communication.

Utah Division of Wildlife Resources. 2005. Last Chance townsendia. Utah Conservation Data Center. Web Page Accessed July 21, 2005. http://dwrcdc.nr.utah.gov/ucdc/.

U.S. Fish and Wildlife Service (USFWS). 1993. Last Chance townsendia (*Townsendia aprica*) Recovery Plan. Denver, Colorado: U.S. Fish and Wildlife Service. p.18.

Welsh S.L., N.D. Atwood, S. Goodrich, L.C. Higgins. 1993. A Utah Flora, second edition, Brigham Young University, Provo UT, U.S.A., 264.pp

Uinta Basin hookless cactus

Evans, J. W. 1939. *Sclerocactus franklinii.* Cactus and Succulent Journal (U.S.) 11.74.

Heil, K. D. and J. M. Porter. 1993. Status Report for *Sclerocactus Glaucus*. Prepared for U.S. Fish and Wildlife Service by Ecosphere Environmental Services. New Mexico.

Heil, K. D. and J. M. Porter. 1994. *Sclerocactus* (Cactaceae) a revision. Haseltonia 2:20-46.

Heil, K. D. and J. M. Porter. 2004. Eagle-claw cactus, fishhook cactus [Greek *sclero*, hard, cruel, in reference to the hooked spines, and *Cactus*, an old genus name]. Website: www.eFloras.org, Flora of North America Vol. 4: pages 98, 99, 193, and 197.

Hochstätter, F. 1993. Revision *Sclerocactus* II. Succulenta 72:19-34.

Hochstätter, F. 1989. *Sclerocactus wetlandicus* Hochstätter, Succulentia (Netherlands). 68: 123 pp.

Porter, J. M., J. Cruss-Sanders, and R. Lauri. 2006. A preliminary assessment of genetic relationships among *Sclerocactus brevispinus* Heil & Porter, *S. Wetlandicus* Hochstätter, and *S. glaucus* (K. Schum.) L. Benson. Draft report for U.S. Fish and Wildlife Service.

Purpus, J. A. 1925. Mitt. Deutsdch. Dendr. Gesellsch. 1925: 50.

Rechel, E. A., R. G. Ballard, and T. J. Novotny. 1999. Ecology of the Threatened Cactus, *Sclerocactus glaucus*. Cactus and Succulent Journal: Vol. 71, No. 3.

Rydberg, P. A. 1917. Flora of the Rocky Mountains and adjacent plains. Published by the author. New York. 580 pp.

U.S. Fish and Wildlife Service (USFWS). 1979. Endangered and Threatened Wildlife and Plants; Determination That *Sclerocactus glaucus* is a Threatened Species. Federal Register Vol. 44, No. 198.

U.S. Fish and Wildlife Service (USFWS). 1990. Uinta Basin Hookless Cactus (*Sclerocactus glaucus)* Recovery Plan. Denver, Colorado. 26 pp.

Barneby reed-mustard

Clark, Deborah J.; Groebner, Christine M. Determining Habitat Potential and Surveying for Nine Rare Plant Species in South-Central Utah. Southwestern rare and endangered plants: proceedings of the third conference; September 25-28; Flagstaff, AZ. In: Maschinski, Joyce; Holter, Louella, editors. 2000. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Fort Collins, CO (Proceedings RMRS-P-23). p. 38-43.

Franklin, M. A. 1993. Survey report on *Asclepias welshii* N. Holmgren & P. Holmgren. Prepared for USDI Fish and Wildlife Service, Utah Field Office, Salt Lake City. Utah Natural Heritage Program, Department of Natural Resources, Salt Lake City, Utah. 6 pp. + appendices.

Utah Division of Wildlife Resources, Utah Natural Heritage Program (UNHP). 2003. Unpublished data: Maps of Barneby, clay and shrubby reed-mustard populations provided to B&A from UNHP, Salt Lake City, Utah.

U.S. Fish and Wildlife Service (57 FR 1398 1403) (USFWS). 1992. Endangered and Threatened Wildlife and Plants; Final Rule to Determine the Plant *Schoenocrambe argillacea* (Clay Reed-Mustard) To Be a Threatened Species, and the Plant *Schoenocrambe barnebyi* (Barneby Reed-Mustard) To Be an Endangered Species. U. S. Fish and Wildlife Service. Federal Register Vol. 57, No. 9.

U.S. Fish and Wildlife Service (USFWS). 1994. Utah reed-mustards: clay reed-mustard (*Schoenocrambe argillacea*), Barneby reed-mustard (*Schoenocrambe barnebyi*), shrubby reed-mustard (*Schoenocrambe suffrutescens*) recovery plan. Denver, Colorado. 22 pp.

Jones cycladenia

Cann, D. 2002. Jones Cycladenia Status Report. U.S. Bureau of Land Management.

Sipes, S. D. and J. Boettinger. 1997. Soil morphology influences the distribution of Jones cycladenia (*Cycladenia humilis* var. *jonesii* (Eastw.) Welsh and Atwood: Apocynaceae), a rare endemic of southern Utah and northern Arizona. Annual meeting of the Botanical Society of America, Montreal, Quebec, Canada.

Sipes S. D. and V. J. Tepedino. 1996. Pollinator Lost? Reproduction by the Enigmatic Jones Cycladenia, *Cycladenia humilis* var. *jonesii* (Apocynaceae). American Journal of Botany 84(3):401-409.

Sipes, S. D., P. G. Wolf, and V.J. Tepedino. 1992. Final report: population genetics of *Cycladenia humilis* var. *jonesii*. Submitted to the Bureau of Land Management, Salt Lake City, Utah.

Sipes, S. D., P. G. Wolf, V. J. Tepedino, and J. Boettinger. 1994. Final report: population genetics and ecology of Jones cycladenia. Submitted to the Bureau of Land Management, Salt Lake City, Utah.

Welsh S. L. and N. D. Atwood. 1975. Endangered, Threatened, Extinct, Endemic, and Rare or Restricted Utah Vascular Plants. Great Basin Naturalist 35:333.

Sipes, S.D., P.G. Wolf, and V.J. Tepedino. 1992. Final report: population genetics of *Cycladenia humilis* var. *jonesii*. Submitted to the Bureau of Land Management, Salt Lake City, Utah.

Maguire daisy

Alston, D. and V. Tepedino. 2005. Integrated Pest Management, T & E Plant Pollinators. PMIS # Capitol Reef National Park 59990, Project Statement: CARE-N-024.001. 83pp.

Anderson, J. 1982. Memo to John Anderson on June 25, 1982, regarding the Search for *Erigeron maguirei*. U.S. Fish and Wildlife Service, Denver, Colorado. 3 pp Clark, D. J. 2002. Summary of the Interagency Rare Plant Inventory Project. 1999 through 2002. In cooperation with Dixie National Forest, Teasdale, Utah; Bureau of Land Management, Richfield, Utah; Capitol Reef National Park, Torrey, Utah; and Fishlake National Forest, Richfield, Utah. October 29, 2002.

Clark, D.J. 2002. Summary of the Interagency Rare Plant Inventory Project 1999 through 2002. Unpublished Document. Capitol Reef National Park. National Park Service. October 2002. 81 pp.

Clark, D.J. 2006. Post-delisting Monitoring Protocol for *Erigeron maguirei*. Draft September 1, 2006. Capitol Reef National Park, HC 70, Box 15, Torrey, Utah 84775. 24 pp.

Clark, D.J., and T.O. Clark. 1999. Rare plant survey at Capitol Reef National Park. Park Science 19 (2):44-49.

Clark, D.J., T.O. Clark, and M.D. Cruz. 2005. Status Report for *Erigeron maguirei* Cronq. (Maguire's Daisy). Unpublished Document. Capitol Reef National Park. National Park Service. November 2005. 29 pp.

Clark, D.J., T.O. Clark, and M.D. Cruz. 2006. Status Report *Erigeron maguirei* Cronq. (Maguire's Daisy). Unpublished Document. Capitol Reef National Park. National Park Service. August 24, 2006. 30 pp.

Cronquist, A, A. H. Holmgren, N. H. Holmgren and J. L. Reveal. 1972. Intermountain flora, vol. 1: Geological and botanical history of the region, its plant geography and a glossary. The vascular cyptograms and the gymnosperms. New York: Hafner. 270 pp.

Harper, K. T., and R. Van Buren. 1998. Status Report for *Erigeron maguirei* 1997. Submitted to the Bureau of Land Management. Prepared by Kimball T. Harper, Brigham Young University, Provo, Utah, and Renee Van Buren, Utah Valley State College, Orem, Utah. 13 February.

Kass, R. J. 1990. Final Report of Habitat Inventory of Threatened, Endangered, and Candidate Plant Species in the San Rafael Swell, Utah. Prepared for Bureau of Land Management, Utah State Office, Salt Lake City, Utah. Prepared by Ronald J. Kass, Environmental Consulting, Springville, Utah. Solicitation UT910-RFPS-028. January 3, 1990.

U.S. Fish and Wildlife Service (USFWS). 1985. Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for *Erigeron maguirei* var. *maguirei* (Maguire daisy). 50 CFR Part 17. Federal Register Vol. 50, No. 172, Pages 36089 to 36092. Thursday, September 5, 1985.

U.S. Fish and Wildlife Service (USFWS). 1996. Endangered and Threatened Wildlife and Plants: Reclassification of *Erigeron Maguirei* (Maguire Daisy) from Endangered to Threatened. Final Rule 50 CFR Part 17, Vol. 61, No. 119. June 19, 1996.

Van Buren, R. 1993. Field Report 1993. *Erigeron maguirei* var. *maguirei* and *E. maguirei* var. *harrisonii*. Prepared by R. Van Buren. December 1, 1993.

Colorado River fish

Bonytail

Cope, E. D., and H. C. Yarrow. 1875. Reports upon the collections of fishes made in portions of Nevada, Utah, California, Colorado, New Mexico, and Arizona during the years 1871, 1872, 1873, and 1874. Report of Geographical and Geological Explorations West of the 100th Meridian (Wheeler Survey) 5:635–703.

Gilbert, C. H., and N.B. Scofield. 1898. Notes on a collection of fishes from the Colorado Basin in Arizona. Proceedings of the U.S. National Museum 20:487–499.

Holden, P. B., and C. B. Stalnaker. 1970. Systematic studies of the genus *Gila* (Cyprinidae) of the Colorado River. Copeia 1970:409–420.

Holden, P. B., and C. B. Stalnaker. 1975. Distribution of fishes in the Dolores and Yampa river systems of the upper Colorado basin. Southwestern Naturalist 19:403–412.

Jordan, D. S. 1891. Report of explorations in Colorado and Utah during the summer of 1889, with an account of the fishes found in each of the river basins examined. U.S. Fish Commission, Bulletin 9:1–40.

Jordan, D.S., and B.W. Evermann. 1896. The fishes of North and Middle America. Bulletin of the U.S. National Museum 47:1–1240.

Kaeding, L. R., B. D. Burdick, P. A. Schrader, and W. R. Noonan. 1986. Recent capture of a bonytail (*Gila elegans*) and observations of this nearly extinct cyprinid from the Colorado River. Copeia 4:1021–1023.

Kirsch, P. H. 1889. Notes on a collection of fishes obtained in the Gila River at Fort Thomas, Arizona, Lt. W.L. Carpenter, U.S. Army. Proceedings of the U.S. National Museum 11:555–558.

Miller, R. R. 1961. Man and the changing fish fauna of the American Southwest. Michigan Academy of Science, Arts, and Letters Paper 46:365–404.

Miller, W. H., L. R. Kaeding, H. M. Tyus, C. W. McAda, and B. D. Burdick. 1984. Windy Gap Fishes Study. U.S. Department of the Interior, Fish and Wildlife Service, Salt Lake City, Utah. 37 pp.

Minckley, W. L. 1973. Fishes of Arizona. Arizona Game and Fish Department, Sims Printing Company, Inc., Phoenix, Arizona.

Nesler, T. P., K. Christopherson, J. M. Hudson, C. W. McAda, F. Pfeifer, and T. E. Czapla. 2003. An integrated stocking plan for razorback sucker, bonytail, and Colorado pikeminnow for the Upper Colorado River Endangered Fish Recovery Program. Addendum to State Stocking Plans.

Ono, R. D., J. D. Williams, and A. Wagner. 1983. Vanishing fishes of North America. Stone Wall Press, Washington, D.C.

U.S. Fish and Wildlife Service (USFWS). 1994. Determination of critical habitat for four endangered Colorado River fishes. Federal Register 59(54):13374-13400.

U.S. Fish and Wildlife Service (USFWS). 2002a. Bonytail (*Gila elegans*) Recovery Goals: amendment and supplement to the Bonytail Chub Recovery Plan. U.S. Fish and Wildlife Service, Mountain- Prairie Region (6), Denver, Colorado.

Valdez, R. A. 1990. The endangered fish of Cataract Canyon. Final Report of Bio/West, Inc., Logan, Utah, to U.S. Bureau of Reclamation, Salt Lake City, Utah.

Valdez, R. A., P. G. Mangan, R. Smith, and B. Nilson. 1982. Upper Colorado River investigations (Rifle, Colorado, to Lake Powell, Utah). Pages 100–279 *in* U.S. Fish and Wildlife Service. Colorado River Fishery Project, Final Report, Part 2: Field Investigations. U.S. Fish and Wildlife Service, Salt Lake City, Utah.

Valdez, R. A. M. Moretti, and R. J. Ryel. 1994. Records of bonytail captures in the upper Colorado River Basin. Unpublished report. Utah Division of Wildlife Resources, Salt Lake City, Utah.

Vanicek, C. D. 1967. Ecological studies of native Green River fishes below Flaming Gorge Dam, 1964–1966. Doctoral Dissertation. Utah State University, Logan, Utah.

Vanicek, C. D., and R. Kramer. 1969. Life history of the Colorado squawfish, *Ptychocheilus lucius*, and the Colorado chub, *Gila robusta*, in the Green River in Dinosaur National Monument, 1964–1966. Transactions of the American Fisheries Society 98:193–208.

Wick, E. J., D. E. Snyder, D. Langlois, and T. Lytle. 1979. Colorado squawfish and humpback chub population and habitat monitoring. Federal Aid to Endangered Wildlife Job Progress Report. SE-3-2. Colorado Division of Wildlife, Denver, Colorado. 56 pp. + appendices.

Wick, E. J., T. A. Lytle, and C. M. Haynes. 1981. Colorado squawfish and humpback chub population and habitat monitoring, 1979–1980. Endangered Wildlife Investigations, Colorado Division of Wildlife, Denver, Colorado.

Colorado pikeminnow

Behnke, R. J. 1980. The impacts of habitat alterations on the endangered and threatened fishes of the Upper Colorado River Basin: A discussion *in* Energy Development in the Southwest: Problems of water, fish, and wildlife in the Upper Colorado River Basin. vol. 2, ed. W. O. Spofford. Jr., A.L. Parker, and A.V. Kneese, pp. 182-192. Research Paper R-18. Washington, D.C.: Resources for the Future.

Behnke, R. J., and D. E. Benson. 1983. Endangered and threatened fishes of the Upper Colorado River Basin. Colorado State University Cooperative Extension Service Bulletin 503A.

Bell, A., D. Berk, and P. Wright. 1998. Green River flooded bottomlands mapping for two water flows in May 1996 and one water flow in June 1997. Technical Memorandum No. 8260-98-07. U.S. Bureau of Reclamation, Technical Service Center, Denver, Colorado.

Bestgen, K. R., D. W. Beyers, G. B. Haines, and 3. A. Rice. 1997. Recruitment models for Colorado squawfish: tools for evaluating relative importance of natural and managed processes. Final Report of Colorado State University Larval Fish Laboratory to U.S. National Park Service Cooperative Parks Study Unit and U.S. Geological Survey Midcontinent Ecological Science Center, Fort Collins, Colorado.

Bestgen, K. R., R. T. Muth, and M. A. Trammell. 1998. Downstream transport of Colorado squawfish larvae in the Green River drainage: temporal and spatial variation in abundance and relationships with juvenile recruitment. Final Report of Colorado State University Larval Fish Laboratory to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Carlson, C. A., and R. T. Muth. 1989. The Colorado River lifeline of the American Southwest. Canadian Special Publication of Fisheries and Aquatic Sciences 106:220-239.

Day, K. S., and C. Crosby. 1997. An assessment of young-of-the-year Colorado squawfish (*Ptychocheilus lucius*) use of backwater habitats in the Green River, Utah. Utah Division of Wildlife Resources, Vernal, Utah.

Day, K. S., K. D. Christopherson, and C. Crosby. 1999a. An assessment of young-of-the-year Colorado pikeminnow (*Ptychocheilus lucius*) use of backwater habitats in the Green River, Utah. Report B in Flaming Gorge Studies: assessment of Colorado pikeminnow nursery habitat in the Green River. Final Report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Day, K. S., K. D. Christopherson, and C. Crosby. 1999b. Backwater use by young-of-year chub (*Gila* spp.) and Colorado pikeminnow in Desolation and Gray canyons of the Green River, Utah. Report B in Flaming Gorge Studies: reproduction and recruitment of *Gila* spp. and Colorado pikeminnow (*Ptychocheilus lucius*) in the middle Green River. Final Report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Dill, W. A. 1944. The fishery of the lower Colorado River. California Fish and Game 30:109-211.

Haines, 0. B., and H. M. Tyus. 1990. Fish associations and environmental variables in age-0 Colorado squawfish habitats, Green River, Utah. Journal of Freshwater Ecology 5:427-436.

Hamilton, S.J., and R.H. Wiedmeyer. 1990. Bioaccumulation of a mixture of boron, molybdenum, and selenium in chinook salmon. Transactions of the American Fisheries Society 119:500–510.

Hamilton, S. J., K. J. Buhl, F. A. Bullard, and S. F. McDonald. 1996. Evaluation of toxicity to larval razorback sucker of selenium-laden food organisms from Ouray NWR on the Green River, Utah. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Hamilton, S. J., and B. Waddell. 1994. Selenium in eggs and milt of razorback sucker *(Xyrauchen texanus)* in the middle Green River, Utah. Archives of Environmental Contamination and Toxicology 27:195-201.

Hamman, R. L. 1981. Spawning and culture of Colorado squawfish in raceways. Progressive Fish-Culturist 43:173-177.

Harvey, M. D., R. A. Mussetter, and E. J. Wick. 1993. A physical process biological-response model for spawning habitat formation for the endangered Colorado squawfish. Rivers 4:114-131.

Hawkins, J. A., and J. O'Brien. 2001. Research plan for developing flow recommendations in the Little Snake River, Colorado and Wyoming, for endangered fishes of the Colorado River Basin. Colorado State University, Larval Fish Laboratory, final report to the Upper Colorado River Endangered Fish Recovery Program. Denver, Colorado.

Holden, P. B. 1977. Habitat requirements of juvenile Colorado River squawfish. U.S. Fish and Wildlife Service Report FWS/OBS/77/65. Fort Collins, Colorado.

Holden, P. B. (ed.). 1999. Flow recommendations for the San Juan River. San Juan River Basin Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Irving, D., and T. Modde. 2000. Home-range fidelity and use of historical habitat by adult Colorado squawfish *(Piychocheilus lucius)* in the White River, Colorado and Utah. Western North American Naturalist 60:16-25.

Johnson, B. L., W. B. Richardson, and T. J. Naimo. 1995. Past, present, and future concepts in large river ecology. BioScience 45:134-141.

Joseph, T. W., J. A. Sinning, R. J. Behnke, and P. B. Holden. 1977. An evaluation of the status, life history, and habitat requirements of endangered and threatened fishes of the upper Colorado River system. U.S. Fish and Wildlife Service, Office Biological Services, Fort Collins, Colorado. 183 pp.

Junk, W. J., P. B. Bailey, and R. E. Sparks. 1989. The flood pulse concept in river-floodplain systems. Canadian Special Publication of Fisheries and Aquatic Sciences 106:110-127.

Lanigan, S. H., and C. R. Berry, Jr. 1979. Distribution and abundance of endemic fishes in the White River in Utah, final report. Contract #14-16-006-78-0925. U.S. Bureau of Land Management, Salt Lake City, Utah. 84 pp.

McAda, C. W. 2000. [under revision] Flow recommendations to benefit endangered fishes in the Colorado and Gunnison rivers. Draft Final Report of U.S. Fish and Wildlife Service, Grand Junction, Colorado, to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

McAda, C. W., W. R. Elmblad, K. S. Day, M. A. Trammell, and T. E. Chart. 1997. Interagency Standardized Monitoring Program: summary of results, 1996. Final Report, Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

McAda, C. W., J. W. Bates, J. S. Cranney, T. E. Chart, W. R. Elmblad, and T. P. Nessler. 1994a. Interagency Standardized Monitoring Program: summary of results, 1986-1992. Final Report, Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

McAda, C. W., J. W. Bates, J. S. Cranney, T. E. Chart, M. A. Trammel, and W. R. Elmblad. 1994. Interagency Standardized Monitoring Program: summary of results, 1993. Annual Report, Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Meffe, G. K. 1985. Predation and species replacement on American southwestern fishes: a case study. Southwestern Naturalist 30(2):173-187.

Miller, R. R. 1961. Man and the changing fish fauna of the American Southwest. Papers of the Michigan Academy of Science, Arts, and Letters 46:365-404.

Minckley, W. L. 1982. Trophic Interrelations Among Introduced Fishes in the Lower Colorado River, Southwestern United States. California Fish and Game 68: 78-89.

Minckley, W. L., and J. E. Deacon. 1968. Southwestern fishes and the enigma of "endangered species." Science 159:1424-1433.

Moyle, P.B. 1976. Inland fishes of California. University of California Press, Berkeley, California.

Muth, R. T., and D. E. Snyder. 1995. Diets of young Colorado squawfish and other small fish in backwaters of the Green River, Colorado and Utah. Great Basin Naturalist 55:95-104.

Muth, R. T., L. W. Crist, K. E. LaGory, J. W. Hayse, K. R. Bestgen, T. P. Ryan, J. K. Lyons, R. A. Valdez. 2000. Flow and temperature recommendations for endangered fishes in the Green River downstream of Flaming Gorge Dam. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Nesler, T. P., R. T. Muth, and A. F. Wasowicz. 1988. Evidence for baseline flow spikes as spawning cues for Colorado squawfish in the Yampa River, Colorado. American Fisheries Society Symposium 5:68-79.

Nesler, T. P. 2000. Recovery of the Colorado River endangered fishes: biological recovery goals and criteria for Colorado pikeminnow, humpback chub, razorback sucker, and bonytail. Colorado Division of Wildlife, Denver, Colorado.

O'Brien, J. S. 1984. 1983 Yampa River cobble reach morphology investigation. Final Report. U.S. Fish and Wildlife Service, Denver, Colorado. 79 pp.

Osmundson, D. B. 2002. Dynamics of the upper Colorado River population of Colorado pikeminnow. Draft Final Report of U.S. Fish and Wildlife Service, Grand Junction, Colorado, to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Osmundson, D. B., P. Nelson, K. Fenton, and D. W. Ryden. 1995. Relationships between flow and rare fish habitat in the "15-Mile Reach" of the upper Colorado River. Final Report. U.S. Fish and Wildlife Service, Grand Junction, Colorado.

Osmundson, D. B., R. J. Ryel, and T. E. Mourning. 1997. Growth and survival of Colorado squawfish in the Upper Colorado River. Transaction of the American Fisheries Society 126:687-698.

Osmundson, D. B., and K. P. Burnham. 1998. Status and trends of the endangered Colorado squawfish in the upper Colorado River. Transactions of the American Fisheries Society 127:957–970.

Osmundson, B. C., T. W. May, and D.B. Osmundson. 2000. Selenium concentrations in the Colorado pikeminnow (*Ptychocheilus lucius*): relationship with flows in the upper Colorado River. Archives of Environmental Contamination and Toxicology 38:479–485.

Osmundson, D. B., and L. R. Kaeding. 1989. Studies of Colorado squawfish and razorback sucker use of the "15-mile reach" of the upper Colorado River as part of conservation measures for the Green Mountain and Ruedi Reservoir water sales. Final Report of U.S. Fish and Wildlife Service Colorado River Fishery Project, Grand Junction, Colorado.

Osmundson, D. B., and L. R. Kaeding. 1991. Flow recommendations for maintenance and enhancement of rare fish habitat in the 15-mile reach during October-June. Final Report. U.S. Fish and Wildlife Service, Grand Junction, Colorado.

Propst, D. L., and K. R. Bestgen. 1991. Habitat and biology of the loach minnow, *Tiaroga cobitis*, in New Mexico. Copeia 1991(1):29-30.

Pucherelli, M. J., R. C. Clark, and R. D. Williams. 1990. Mapping backwater habitat on the Green River as related to the operation of Flaming Gorge Dam using remote sensing and GIS. U.S. Bureau of Reclamation 90 (18):1-11.

Rakowski, C. L., and J. C. Schmidt. 1999. The geomorphic basis of Colorado pikeminnow nursery habitat in the Green River near Ouray, Utah. Report A *in* Flaming Gorge Studies: Assessment of Colorado pikeminnow nursery habitat in the Green River. Final Report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Rinne, J. N. 1991. Habitat use by spinedace, *Meda fulgida* (Pisces: Cyprinidae) in southwestern streams with reference to probable habitat competition by red shiner (Pisces: Cyprinidae). Southwestern Naturalist 36(1):7-13.

Ryden, D. W., and L. A. Ahlm. 1996. Observations on the distribution and movements of Colorado squawfish, *Ptychocheilus lucius*, in the San Juan River, New Mexico, Colorado, and Utah. Southwestern Naturalist 41:161–168.

Seethaler, K. 1978. Life history and ecology of the Colorado squawfish (*Ptychocheilus lucius*) in the upper Colorado River basin. Master's Thesis. Utah State University, Logan, Utah.

Stephens, D. W., B. Waddell, L. A. Peltz, and J. B. Miller. 1992. Detailed study of selenium and select elements in water, bottom sediment, and biota associated with irrigation drainage in the middle Green River basin, Utah, 1988–90. Water-Resources Investigation Report 92-4084. U.S. Geological Survey, Salt Lake City, Utah.

Stephens, D. W., and B. Waddell. 1998. Selenium sources and effects on biota in the Green River basin of Wyoming, Colorado, and Utah. Pages 183–203 *in* W.J. Frankenberg and R.A. Engberg (eds.). Environmental chemistry of selenium. Marcel Dekker, New York, New York.

Trammell, M. A., and T. E. Chart. 1999. Colorado pikeminnow young-of-the year habitat use, Green River, Utah, 1992-1996. Report C *in* Flaming Gorge Studies: Assessment of Colorado pikeminnow nursery habitat in the Green River. Final Report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Tyus, H. M. 1985. Homing behavior noted for Colorado squawfish. Copeia 1985:213-215.

Tyus, H. M. 1990. Potamodromy and reproduction of Colorado squawfish in the Green River basin, Colorado and Utah. Transactions of the American Fisheries Society 119:1035-1047.

Tyus, H. M. 1991. Ecology and management of Colorado squawfish. Pages 379–402 *in* W.L. Minckley and J.E. Deacon (eds.). Battle against extinction: native fish management in the American west. The University of Arizona Press, Tucson, Arizona.

Tyus, H. M., and G. B. Haines. 1991. Distribution, habitat use, and growth of age-0 Colorado squawfish in the Green River basin, Colorado and Utah. Transactions of the American Fisheries Society 120:79-89.

Tyus, H. M., and C. A. Karp. 1989. Habitat use and streamflow needs of rare and endangered fishes, Yampa River, Colorado. U.S. Fish and Wildlife Service Biological Report 89(14): 1-27.

Tyus, H. M., and C. W. McAda. 1984. Migration, movements, and habitat preferences of Colorado squawfish, *Plychocheilus lucius,* in the Green, White, and Yampa Rivers, Colorado and Utah. Southwestern Naturalist 29:289-299.

Tyus, H. M., and J. F. Saunders. 1996. Nonnative fishes in the upper Colorado River basin and a strategic plan for their control. Final Report of University of Colorado Center for Limnology to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Tyus, H. M., B.D. Burdick, R. A. Valdez, C. M. Haynes, T. A. Lytle, and C. R. Berry. 1982. Fishes of the upper Colorado River basin: distribution, abundance, and status. Pages 12–70 *in* W.H. Miller, H.M. Tyus, and C.A. Carlson (eds.). Fishes of the upper Colorado River system: present and future. Western Division, American Fisheries Society, Bethesda, Maryland.

U.S. Fish and Wildlife Service (USFWS). 1994. Determination of critical habitat for four endangered Colorado River fishes. Federal Register 59(54):13374-13400.

U.S. Fish and Wildlife Service (USFWS). 2002. Colorado pikeminnow (*Ptychocheilus lucius*) Recovery Goals: amendment and supplement to the Colorado Squawfish Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

Valdez, R. A., and W. J. Masslich. 1989. Winter habitat study of endangered fish — Green River: wintertime movement and habitat of adult Colorado squawfish and razorback suckers. Final Report of BIO/WEST, Inc. to U.S. Bureau of Reclamation, Salt Lake City, Utah.

Vanicek, C. D., and R. H. Kramer. 1969. Life history of the Colorado squawfish, *Plychocheilus lucius,* and the Colorado chub, *Gila robusta,* in the Green River in Dinosaur National Monument 1964-1966. Transactions of the American Fisheries Society 98:193-208.

Humpback chub

Archer, D. L., L. R. Kaeding, B. D. Burdick, and C. W. McAda. 1985. A study of the endangered fishes of the Upper Colorado River. Final Report - Cooperative Agreement 14-16-0006-82-959. U.S. Department of the Interior, Fish and Wildlife Service, Grand Junction, Colorado. 134 pp.

Arizona Game and Fish Department. 1996. The ecology of Grand Canyon backwaters. Final Report to U.S. Bureau of Reclamation, Upper Colorado Region, Glen Canyon Environmental Studies, Flagstaff, Arizona.

Bestgen, K. R., and L. W. Crist. 2000. Response of the Green River fish community to construction and re-regulation of Flaming Gorge Dam, 1962-1996. Final Report of Colorado State University Larval Fish Laboratory to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Binns, N. A. 1967. Effects of rotenone treatment on the fauna of the Green River, Wyoming. Wyoming Game and Fish Commission, Fisheries Technical Bulletin 1:1-1 14.

Bookstein, F., B. Chernoff, R. Elder, J. Humphries, G. Smith and R. Strauss. 1985. Morphometrics in Evolutionary Biology. Special Publication 15. The Academy of Natural Sciences Press, Philadelphia, Pennsylvania. 277 pp.

Bosley, C. E. 1960. Pre-impoundment study of the Flaming Gorge Reservoir. Wyoming Game and Fish Commission, Fisheries Technical Report 9:1-81.

Burdick, B. D. and L. R. Kaeding. 1985. Reproductive ecology of the humpback chub and the roundtail chub in the Upper Colorado River. Proceedings of the Annual Conference of Western Association of Game and Fish Agencies. 65:163 (abstract).

Chart, T. E., and L. Lentsch. 1999a. Flow effects on humpback chub (*Gila cypha*) in Westwater Canyon. Final Report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Chart, T. E., and L. D. Lentsch. 1999b. Reproduction and recruitment of *Gila* spp. and Colorado pikeminnow (*Ptychocheilus lucius*) in the middle Green River 1992–1996. Final Report to the Recovery Program for the Endangered Fishes in the Upper Colorado River Basin, Project Number 39. Utah Division of Wildlife Resources, Moab and Salt Lake City, Utah.

Chart, T. E., and L. D. Lentsch. 2000. Reproduction and recruitment of *Gila* spp. and Colorado pikeminnow *(Plychocheilus lucius)* in the middle Green River 1992—1996. Report C *in* Flaming Gorge Studies: reproduction and recruitment of *Gila* spp. and Colorado pikeminnow *(Psychocheilus lucius)* in the middle Green River. Final Report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Douglas, M. E., and P. C. Marsh. 1996. Population estimates/population movements of *Gila cypha,* an endangered cyprinid fish in the Grand Canyon region of Arizona. Copeia 1996:15-28.

Euler, R. C. 1978. Archaeological and paleobiological studies at Stanton's Cave, Grand Canyon National Park, Arizona. A report of progress. Pages 141–162 in National Geographic Society Research Report, 1978.

Gaufin, A. R., G. R. Smith, and P. Dotson. 1960. Aquatic survey of the Green River and tributaries within the Flaming Gorge Reservoir basin, Appendix A. Pages 139B162 *in* A.M. Woodbury (ed.) Ecological studies of the flora and fauna of Flaming Gorge Reservoir basin, Utah and Wyoming. University of Utah Anthropological Papers 48.

Girard, C. 1856. Researches upon the cyprinoid fishes inhabiting the fresh waters of the United States of America, west of the Mississippi Valley, from specimens in the museum of the Smithsonian Institution. Academy of Natural Science of Philadelphia Proceedings 8:165–213.

Gorman, 0. T., and D. M. Stone. 1999. Ecology of spawning humpback chub, *Gila cypha,* in the Little Colorado River near Grand Canyon, Arizona. Environmental Biology of Fishes 55(1-2): 115-133.

Hamman, R. L. 1982. Spawning and culture of humpback chub. Progressive Fish-Culturist 44:213-216.

Holden, P. B. 1968. Systematic studies of the genus *Gila* (Cyprinidae) of the Colorado River Basin. Master's Thesis. Utah State University, Logan, Utah.

Holden, P. B. 1973. Distribution, abundance, and life history of the fishes of the upper Colorado River basin. Ph.D. Dissertation. Utah State University, Logan, Utah.

Holden, P. B., and C. B. Stalnaker. 1970. Systematic studies of the cyprinid genus *Gila* in the Upper Colorado River Basin. Copeia 1970(3):409-420.

Holden, P. B., and L. W. Crist. 1981. Documentation of changes in the macroinvertebrate and fish populations in the Green River due to inlet modification of Flaming Gorge Dam. Final Report PR-16-5 of Bio/West, Inc., Logan, Utah, to U.S. Fish and Wildlife Service, Salt Lake City, Utah.

Holden, P. B. and C. B. Stalnaker. 1975. Distribution of fishes in the Dolores and Yampa River systems of the Upper Colorado Basin. Southwestern Naturalist 19:403-412.

Jones, A. T. 1985. A cross section of Grand Canyon archaeology: excavations at five sites along the Colorado River. Western Archaeological and Conservation Center Publication in Anthropology Number 28.

Kaeding, L. R., and M. A. Zimmerman. 1983. Life history and ecology of the humpback chub in the Little Colorado and Colorado Rivers of the Grand Canyon. Transactions of the American Fisheries Society 112:577-594.

Kaeding, L. R., B. D. Burdick, P. A. Schrader, and C. W. McAda. 1990. Temporal and Spatial Relations between the Spawning of Humpback Chub and Roundtail Chub in the Upper Colorado River. Transactions of the American Fish Society 119:135-144.

Karp, C. A., and Tyus, H. M. 1990. Humpback chub (*Gila cypha*) in the Yampa and Green Rivers, Dinosaur National Monument, with observations on roundtail chub (*G. robusta*) and other sympatric fishes. Great Basin Naturalist 50:257-264.

Kidd, G. T. 1977. An investigation of endangered and threatened fish species in the upper Colorado River as related to Bureau of Reclamation projects. Final Report to U.S. Bureau of Reclamation. Northwest Fishery Research, Clifton, Colorado.

Kolb, E., and E. Kolb. 1914. Experiences in the Grand Canyon. The National Geographic Magazine, Vol. XXVI (2):99–184.

Kubly, D. M. 1990. The endangered humpback chub *Gila cypha* in Arizona: a review of past and suggestions for future research. Arizona Game and Fish Department, Phoenix, Arizona.

Maddux, H. R, D. M. Kubly, J. C. deVos, W. R. Persons, R. Staedicke, and R. L. Wright. 1987. Evaluation of varied flow regimes on aquatic resources of Glen and Grand Canyon. Final Report of Arizona Game and Fish Department to U.S. Bureau of Reclamation, Glen Canyon Environmental Studies, Salt Lake City, Utah.

Marsh, P. C. 1985. Effect of Incubation Temperature on Survival of Embryos of Native Colorado River Fishes. Southwestern Naturalist 30(1):129-140.

McDonald, D. B., and P. A. Dotson. 1960. Pre-impoundment investigation of the Green River and Colorado River developments. *In* Federal aid in fish restoration investigations of specific problems in Utah's fishery. Federal Aid Project No. F-4-R-6, Departmental Information Bulletin No. 60-3. State of Utah, Department of Fish and Game, Salt Lake City, Utah.

Miller, R. R. 1944. [Unpubl. Manuscript. Letter dated 28, August 1944, pertaining to a list of fishes occurring in Grand Canyon National Park] preliminary checklist.

Miller, R. R. 1946. *Gila cypha*, a remarkable new species of cyprinid fish from the Colorado River in Grand Canyon, Arizona. Journal of the Washington Academy of Science 36(12):409-415.

Miller, R. R. 1955. Fish remains from archaeological sites in the lower Colorado River basin, Arizona. Papers of the Michigan Academy of Science, Arts and Letters 40:125-126.

Miller, R. R., and G. R. Smith. 1972. Fishes collected on the Grand Canyon survey, Lees Ferry to Diamond Creek, August 1968. Unpublished manuscript.

Miller, R. R., and G. R. Smith. 1984. Fish remains from Stanton's Cave, Grand Canyon of the Colorado, Arizona, with notes on the taxonomy of G. cypha. Pages 61–65 in The archeology, geology and paleobiology of Stanton's Cave, in Grand Canyon National Park, Arizona, edited by R.C. Euler. Grand Canyon National History Association Monograph 6, Grand Canyon, Arizona.

Miller, A. S., and W. A. Hubert. 1990. Compendium of existing knowledge for use in making habitat management recommendations for the upper Colorado River basin. Final Report of U.S. Fish and Wildlife Service Wyoming Cooperative Fish and Wildlife Research Unit to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Miller, W. H., J. J. Valentine, D. L. Archer, H. M. Tyus, R. A. Valdez, and L. R. Kaeding. 1982. Colorado River Fishery Project Final Report Summary. U.S. Fish and Wildlife Service, Salt Lake City, Utah. 42 pp.

Minckley, W. L. 1973. Fishes of Arizona. Arizona Game and Fish Department, Phoenix, Arizona. 293 pp.

Minckley, C. O. 1996. Observations on the biology of the humpback chub in the Colorado River Basin, 1908–1990. Doctoral Dissertation. Northern Arizona University, Flagstaff, Arizona.

Minckley, C. O., and D. W. Blinn. 1976. Summer distribution and reproductive status of fish of the Colorado River and its tributaries in Grand Canyon National Park and vicinity, 1975. Final Report to the National Park Service, Contribution No. 42.

Minckley, W. L., D. A. Hendrickson, and C. E. Bond. 1986. Geography of Western North America Freshwater Fishes: Description and Relationships to Intracontinental Tectonism. pp 519-613 In: C.H. Hocutt and E.O. Wiley (eds.). The Zoogeography of North American Freshwater Fishes. Wiley-Interscience, New York, New York.

Robinson, A. T., R. W. Clarkson, and R. E. Forrest. 1998. Dispersal of larval fishes in a regulated river tributary. Transactions of the American Fisheries Society 127:722-786.

Sigler, W. F., and R. R. Miller. 1963. Fishes of Utah. Utah Department of Fish and Game, Salt Lake City, Utah. 203 pp.

Sitgreaves, L. 1853. Report of an expedition down the Zuni and Colorado Rivers. 32nd Congress, 2nd Session, Executive No. 59, Washington, D.C.

Smith, G. R. 1960. Annotated list of fish of the Flaming Gorge Reservoir Basin, 1959. Pages 163-268 in R.M. Woodbury, ed. Ecological Studies of the Flora and Fauna of Flaming Gorge Reservoir Basin, Utah and Wyoming. Department of Anthropology, University of Utah, Salt Lake City. Anthropological Paper Number 48, Series Number 3.

Snyder, D. E. 1981. Contributions to a guide to the cypriniform fish larvae of the upper Colorado River system in Colorado. U.S. Bureau of Land Management Biological Science Series 3:1-81.

Stone, J. L. 1964. Limnological study of Glen Canyon tailwater area of the Colorado River. Colorado River Storage Project, Public Law 485, Section 8, Annual Report. U.S. Bureau of Reclamation, Salt Lake City, Utah.

Stone, J. L. 1966. Tailwater fisheries investigations creel census and limnological study of the Colorado River below Glen Canyon Dam July 1, 1965–June 30, 1966. Arizona Game and Fish Department, Phoenix, Arizona.

Stone, J. L. and A. B. Queenan. 1967. Tailwater fisheries investigations: creel census and limnological study of the Colorado River below Glen Canyon Dam. Colorado River Storage Project, Public Law 485, Section 8, Annual Report of Arizona Game and Fish Department to U.S. Bureau of Reclamation, Salt Lake City, Utah.

Stone, J. L., and N. L. Rathbun. 1968. Tailwater fisheries investigations: creel census and limnological study of the Colorado River below Glen Canyon Dam. Arizona Game and Fish Department, Phoenix, Arizona.

Suttkus, R. D., and G. H. Clemmer. 1977. The humpback chub, *Gila cypha*, in the Grand Canyon area of the Colorado River. Occasional Papers of the Tulane University Museum of Natural History, New Orleans, Louisiana 1:1–30.

Suttkus, R. D., G. H. Clemmer, C. Jones, and C. Shoop. 1976. Survey of the fishes, mammals and herpetofauna of the Colorado River in Grand Canyon. Colorado River Research Series Contribution 34. Grand Canyon National Park, Grand Canyon, Arizona.

Tyus, H. M. 1998. Early records of the endangered fish *Gila cypha*, Miller, from the Yampa River of Colorado with notes on its decline. Copeia 1998:190-193.

Tyus, H. M., and C. A. Karp. 1989. Habitat Use and Streamflow Needs of Rare and Endangered Fishes, Yampa River, Colorado. U.S. Fish and Wildlife Service, Biology Report 89(14). 27 pp.

U.S. Fish and Wildlife Service (USFWS). 1986. Annual report to the Bureau of Reclamation: Colorado River endangered fishes investigations. U.S. Department of the Interior, Fish and Wildlife Service, Division of Endangered Species, Denver, Colorado.

U.S. Fish and Wildlife Service (USFWS). 1990. Humpback Chub Recovery Plan. U.S. Fish and Wildlife Service, Denver, Colorado. 43 pp.

U.S. Fish and Wildlife Service (USFWS). 1994. Determination of critical habitat for four endangered Colorado River fishes. Federal Register 59(54):13374-13400.

U.S. Fish and Wildlife Service (USFWS). 2002b. Humpback chub (*Gila cypha*) Recovery Goals: amendment and supplement to the Humpback Chub Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

Uyeno, T., and Miller, R. R. 1965. Middle Pliocene fishes from the Bidahochi Formation, Arizona. Copeia 1965:28–41.

Valdez, R.A., and G. H. Clemmer. 1982. Life History and prospects for recovery of the humpback and bonytail chub. Pages 109-119 *in* W.M. Miller, H.M. Tyus and C.A. Carlson, eds. Proceedings of a Symposium on Fishes of the Upper Colorado River System: Present and Future. American Fisheries Society, Bethesda, Maryland.

Valdez, R. A., P. G. Mangan, R. Smith, and B. Nilson. 1982. Upper Colorado River fisheries investigations (Rifle, Colorado to Lake Powell, Utah). Pages 100-279 *in* W.H. Miller, J.J. Valentine, D.L. Archer, H.M. Tyus, R.A. Valdez, and L. Kaeding, eds. Part 2-Field investigations. Colorado River Fishery Project. U.S. Bureau of Reclamation, Salt Lake City, Utah.

Valdez, R. A., P. B. Holden, and T. B. Hardy. 1990. Habitat suitability index curves for humpback chub of the Upper Colorado River Basin. Rivers 1:31-42.

Valdez, R. A., and R. J. Ryel. 1995. Life History and Ecology of the Humpback Chub (*Gila cypha)* in the Colorado River, Grand Canyon, Arizona. BIO/WEST, Inc. for the Bureau of Reclamation.

Valdez, R. A., and R .J. Ryel. 1997. Life history and ecology of the humpback chub in the Colorado River in Grand Canyon, Arizona. Pages 3B31 *in* C. van Riper, III and E.T. Deshler (eds.). Proceedings of the Third Biennial Conference of Research on the Colorado Plateau. National Park Service Transactions and Proceedings Series 97/12.

Vanicek, C. D., R. H. Kramer, and D. R. Franklin. 1970. Distribution of Green River fishes in Utah and Colorado following closure of Flaming Gorge dam. Southwestern Naturalist 14:297-315.

Wallis, O. L. 1951. The status of the fish fauna of the Lake Mead National Recreation Area, Arizona-Nevada. Transactions of the American Fisheries Society 80:84–92.

Wick, E. J., D. E. Snyder, D. Langlois, and T. Lytle. 1979. Colorado squawfish and humpback chub population and habitat monitoring. Federal Aid to Endangered Wildlife Job Progress Report. SE-3-2. Colorado Division of Wildlife, Denver, Colorado. 56 pp. + appendices.

Wick, E. J., T. A. Lytle, and C. M. Haynes. 1981. Colorado squawfish and humpback chub population and habitat monitoring, 1979-1980. Progress Report, Endangered Wildlife Investigations. SE-3-3. Colorado Division of Wildlife, Denver, Colorado. 156 pp.

Wick, E. J., J. A. Hawkins, and T. P. Nesler. 1991. Occurrence of two endangered fishes in the Little Snake River, Colorado. Southwestern Naturalist 36:251-254.

Razorback sucker

Behnke, R. J. Benson, and D. E. Benson. 1983. Endangered and threatened fishes of the Upper Colorado River Basin. Colorado State University Cooperative Extension Service Bulletin 503A.

Bestgen, K. R. 1990. Status Review of the Razorback Sucker, *Xyrauchen texanus*. Larval Fish Laboratory #44. Colorado State University, Ft. Collins, Colorado.

Bestgen, K. R., D.W. Beyers, G.B. Haines, and J.A. Rice. 1997. Recruitment models for Colorado squawfish: tools for evaluating relative importance of natural and managed processes. Final Report of Colorado State University Larval Fish Laboratory to U.S. National Park Service Cooperative Parks Unit and U.S. Geological Survey Midcontinent Ecological Science Center, Fort Collins, Colorado.

Bestgen, K. R., G. B. Haines, R. Brunson, T. Chart, M. Trammell, R. T. Muth, G. Birchell, K. Christopherson, and J. M. Bundy. 2002. Status of wild razorback sucker in the Green River Basin, Utah and Colorado, determined from basinwide monitoring and other sampling programs. Draft Report of Colorado State University Larval Fish Laboratory to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Bulkley, R. V., and R. Pimentel. 1983. Temperature preference and avoidance by adult razorback suckers. Transactions of the American Fisheries Society 112:601-607

Burdick, B. D., and R. B. Bonar. 1997. Experimental stocking of adult razorback sucker in the upper Colorado and Gunnison rivers. Final Report to the Recovery Program for the Endangered Fishes of the Upper Colorado River, Project Number 50. U.S. Fish and Wildlife Service, Grand Junction, Colorado.

Burke, T. 1994. Lake Mohave native fish rearing program. U.S. Bureau of Reclamation, Boulder City, Nevada.

Carlson, C. A., and R. T. Muth. 1989. The Colorado River lifeline of the American Southwest. Canadian Special Publication of Fisheries and Aquatic Sciences 106:220-239.

Chart, T. E., D. P. Svendson, and L. D. Lentsch. 1999. Investigation of potential razorback sucker (*Xyrauchen texanus*) and Colorado squawfish (*Ptychocheilus lucius*) spawning in the lower Green River, 1994 and 1995. Final Report to the Recovery Program for the Endangered Fishes in the Upper Colorado River Basin, Project Number 38. Report Number 99-32, Utah Division of Wildlife Resources, Salt Lake City, Utah.

Clarkson, R. W., E. D. Creef, and D. K. McGuinn-Robbins. 1993. Movements and habitat utilization of reintroduced razorback suckers (*Xyrauchen texanus*) and Colorado squawfish (*Ptychocheilus lucius*) in the Verde River, Arizona. Special Report. Nongame and Endangered Wildlife Program, Arizona Game and Fish Department, Phoenix, Arizona.

Ellis, N. M. 1914. Fishes of Colorado. University of Colorado Studies. Vol. 11(1).

Gutermuth, F. B., L. D. Lentsch, and K. R. Bestgen. 1994. Collection of Age-0 Razorback Suckers (*Xyrauchen texanus*) in the Lower Green River, Utah. Southwestern Naturalist 39 (4).

Holden, P.B. 1994. Razorback sucker investigations in Lake Mead, 1994. Report of Bio/West, Inc., Logan, Utah, to Southern Nevada Water Authority.

Holden, P.B. (ed.) 1999. Flow recommendations for the San Juan River. San Juan River Basin Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Holden, P. B., and L. W. Crist. 1981. Documentation of changes in the macroinvertebrate and fish populations in the Green River due to inlet modification of Flaming Gorge Dam. Final Report PR-16-5 of Bio/West, Inc., Logan, Utah, to U.S. Fish and Wildlife Service, Salt Lake City, Utah.

Hubbs, C. L., and R. R. Miller. 1953. Hybridization in nature between the fish genera *Catostomus* and *Xyrauchen*. Papers of the Michigan Academy of Arts, Science and Letters 38:207B233.

Irving, D. B., and B. D. Burdick. 1995. Reconnaissance inventory and prioritization of existing and potential bottomlands in the upper Colorado River basin, 1993–1994. Final Report to the Recovery Program for the Endangered Fishes of the Upper Colorado River. U.S. Fish and Wildlife Service, Vernal, Utah and Grand Junction, Colorado.

Jonez, A., and R. C. Sumner. 1954. Lakes Mead and Mohave investigations: a comparative study of an established reservoir as related to a newly created impoundment. Final Report. Federal Aid Wildlife Restoration (Dingell-Johnson) Project F-1-R, Nevada Game and Fish Commission, Carson City, Nevada.

Jordan, D. S. 1891. Report of explorations in Colorado and Utah during the summer of 1889 with an account of the fishes found in each of the river basins examined. Bulletin of the United States Fish Commission 9:24.

Joseph, T. W., J. A. Sinning, R. J. Behnke, and P. B. Holden. 1977. An evaluation of the status, life history, and habitat requirements of endangered and threatened fishes of the upper Colorado River system. U.S. Fish and Wildlife Service, Office Biological Services, Fort Collins, Colorado. 183 pp.

Lanigan, S. H., and H. M. Tyus. 1989. Population size and status of the razorback sucker in the Green River basin, Utah and Colorado. North American Journal of Fisheries Management 9:1.

Mabey, L. W., and D. K. Shiozawa. 1993. Planktonic and benthic microcrustaceans from floodplain and river habitats of the Ouray Refuge on the Green River, Utah. Department of Zoology, Brigham Young University, Provo, Utah.

Marsh, P. C. 1987. Food of adult razorback sucker in Lake Mohave, Arizona-Nevada. Transactions of the American Fisheries Society 116:117B119.

Marsh, P. C. 1993. Draft biological assessment on the impact of the Basin and Range Geoscientific Experiment (BARGE) on federally listed fish species in Lake Mead, Arizona and Nevada. Arizona State University, Center for Environmental Studies, Tempe, Arizona.

Marsh, P. C., and W. L. Minckley. 1989. Observations on recruitment and ecology of razorback sucker: lower Colorado River, Arizona-California-Nevada. Great Basin Naturalist 49: 71-78.

McAda, C. W. and R. S. Wydoski. 1980. The razorback sucker, *Xyrauchen texanus*, in the Upper Colorado River Basin, 1974-1976. Technical Papers of the U.S. Fish and Wildlife Service 99. U.S. Fish and Wildlife Service, Washington, D.C.

Miller, R. R. 1961. Man and the changing fish fauna of the American Southwest. Papers of the Michigan Academy of Science, Arts, and Letters 46:365-404.

Miller, A. S., and W. A. Hubert. 1990. Compendium of existing knowledge for use in making habitat management recommendations for the upper Colorado River basin. Final Report of U.S. Fish and Wildlife Service Wyoming Cooperative Fish and Wildlife Research Unit to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Minckley, W. L. 1983. Status of razorback sucker, *Xyrauchen texanus* (Abbott), in the Lower Colorado River Basin. Southwestern Naturalist 28:165-187.

Minckley, W. L., P. C. Marsh, J. E. Brooks, J. E. Johnson, and B. L. Jensen. 1991. "Management Toward Recovery of Razorback Sucker *Xyrauchen texanus*." In Battle Against Extinction, W.L. Minckley and J.E. Deacon (eds), University of Arizona Press, Tucson, Arizona, pp. 303-357.

Modde, T. 1996. Juvenile razorback sucker (*Xyrauchen texanus*) in a managed wetland adjacent to the Green River. Great Basin Naturalist 56:375-376.

Modde, T. 1997. Fish use of Old Charlie Wash: an assessment of floodplain wetland importance to razorback sucker management and recovery. Final report of U.S. Fish and Wildlife Service, Vernal, Utah, to Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Modde, T. and D. B. Irving. 1998. Use of multiple spawning sites and seasonal movements by razorback sucker in the middle Green River, Utah. North American Journal of Fisheries Management 18:318-326.

Modde, T., and G. Smith. 1995. Flow recommendations for endangered fishes in the Yampa River. Final Report of U.S. Fish and Wildlife Service, Vernal, Utah, to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Modde, T., and E. J. Wick. 1997. Investigations of razorback sucker distribution movements and habitats used during spring in the Green River, Utah. Final Report of U.S. Fish and Wildlife Service, Vernal, Utah, to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Modde, T., K. P. Burnham, and E. J. Wick. 1996. Population status of the razorback sucker in the middle Green River. Conservation Biology 10: 110-119.

Moyle, P. B. 1976. Inland fishes of California. University of California Press, Berkeley, California.

Muth, R. T. 1995. Conceptual-framework document for development of a standardized monitoring program for basin-wide evaluation of restoration activities for razorback sucker in the Green and Upper Colorado River systems. Colorado State University Larval Fish Laboratory final report to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin, Denver, Colorado.

Muth, R. T. and E. J. Wick. 1997. Field studies on larval razorback sucker in Canyonlands National Park and Glen Canyon National Recreation Area, 1993 – 1995. Final Report of Colorado State University Larval Fish Laboratory to U.S. Park Service Rocky Mountain Region, Denver, Colorado.

Muth, R. T., G. B. Haines, S. M. Meismer, E. J. Wick, T. E. Chart, D. E. Snyder, and J. M. Bundy. 1998. Reproduction and early life history of razorback sucker in the Green River, Utah and Colorado, 19921996. Final Report of Colorado State University Larval Fish Laboratory to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Muth, R. T., L. W. Crist, K. E. LaGory, J. W. Hayse, K. R. Bestgen, T. P. Ryan, J. K. Lyons, R. A. Valdez. 2000. Flow and temperature recommendations for endangered fishes in the Green River downstream of Flaming Gorge Dam. Final Report to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Osmundson, D. B. 2002. Dynamics of the upper Colorado River population of Colorado pikeminnow. Draft Final Report of U.S. Fish and Wildlife Service, Grand Junction, Colorado, to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Osmundson, D. B., and L. R. Kaeding. 1989. Studies of Colorado squawfish and razorback sucker use of the "15-mile reach" of the Upper Colorado River as part of conservation measures for the Green Mountain and Ruedi Reservoir water sales. Final Report. U.S. Fish and Wildlife Service, Grand Junction, Colorado.

Osmundson, D. B., and L. R. Kaeding. 1991. Flow recommendations for maintenance and enhancement of rare fish habitat in the 15-mile reach during October-June. Final Report. U.S. Fish and Wildlife Service, Grand Junction, Colorado.

Platania, S. P. 1990. Biological summary of the 1987 to 1989 New Mexico-Utah ichthyofaunal study of the San Juan River. Unpublished report to the New Mexico Department of Game and Fish, Santa Fe, and the U.S. Bureau of Reclamation, Salt Lake City, Utah, Cooperative Agreement 7-FC-40-05060.

Platania, S. P., and D. A. Young. 1989. A survey of the ichyofauna of the San Juan and Animas rivers from Archuleta and Cedar Hill (respectively) to their confluence at Farmington, New Mexico. Department of Biology, University of New Mexico, Albuquerque, New Mexico.

Ruppert, J. B., R. T. Muth, and T. P. Nesler. 1993. Predation on fish larvae by adult red shiner, Yampa and Green rivers, Colorado. Southwestern Naturalist 38:397B399.

Ryden, D. W. 2000. Monitoring of experimentally stocked razorback sucker in the San Juan River: March 1994 through October 1997. U.S. Fish and Wildlife Service, Colorado River Fishery Project, Grand Junction, Colorado.

Sigler, W. F., and R. R. Miller. 1963. Fishes of Utah. Utah Department of Fish and Game, Salt Lake City, Utah. 203 pp.

Sublette, J. S., M. D. Hatch, and M. Sublette. 1990. The fishes of New Mexico. University of New Mexico Press, Albuquerque, New Mexico.

Taba, S. S., J. R. Murphy, and H. H. Frost. 1965. Notes on the fishes of the Colorado River near Moab, Utah. Proceedings of the Utah Academy of Sciences, Arts, and Letters 42(2):280-283.

Tyus, H. M. 1987. Distribution, reproduction, and habitat use of the razorback sucker in the Green River, Utah, 1979-1986. Transactions of the American Fisheries Society 116:111-116.

Tyus, H. M., and C. A. Karp. 1989. Habitat Use and Streamflow Needs of Rare and Endangered Fishes, Yampa River, Colorado. U.S. Fish and Wildlife Service, Biology Report 89(14). 27 pp.

Tyus, H. M., and C. A. Karp. 1990. Spawning and movements of razorback sucker, *Xyrauchen texanus*, in the Green River Basin of Colorado and Utah. Southwestern Naturalist 35:427B433.

Tyus, H. M., and C. A. Karp. 1991. Habitat use and streamflow needs of rare and endangered fishes in the Green River, Utah. Final Report. Flaming Gorge Studies Program. U.S. Fish and Wildlife Service, Colorado River Fish Project, Vernal, Utah.

U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and threatened wildlife and plants; the razorback sucker (*Xyrauchen texanus*) determined to be an endangered species. Federal Register 56(205): 54957-54967.

U.S. Fish and Wildlife Service (USFWS). 1994. Determination of critical habitat for four endangered Colorado River fishes. Federal Register 59(54):13374-13400.

U.S. Fish and Wildlife Service (USFWS). 1998. Razorback sucker *Xyrauchen texanus* recovery plan. Denver, Colorado.

U.S. Fish and Wildlife Service (USFWS). 2002. Razorback sucker (*Xyrauchen texanus*) Recovery Goals: amendment and supplement to the Razorback Sucker Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

Valdez, R. A., and W. J. Masslich. 1989. Winter habitat study of endangered fish — Green River: wintertime movement and habitat of adult Colorado squawfish and razorback suckers. Final Report of BIO/WEST, Inc. to U.S. Bureau of Reclamation, Salt Lake City, Utah.

Valdez, R. A., P. G. Mangan, R. Smith, and B. Nilson. 1982. Upper Colorado River fisheries investigations (Rifle, Colorado to Lake Powell, Utah). Pages 100-279 in W.H. Miller, J.J. Valentine, D. L. Archer, H. M. Tyus, R. A. Valdez, and L. Kaeding, eds. Part 2-Field investigations. Colorado River Fishery Project. U.S. Bureau of Reclamation, Salt Lake City, Utah.

Vanicek, C. D. 1967. Ecological studies of native Green River fishes below Flaming Gorge dam, 1964-1966. Ph.D. Dissertation. Utah State University, Logan, Utah. 124 pp.

Wolz, E. R., and D. K. Shiozawa. 1995. Soft sediment benthic macroinvertebrate communities of the Green River at the Ouray National Wildlife Refuge, Uintah County, Utah. Great Basin Naturalist 55:213-224.

Wydoski, R. S. and E. J. Wick. 1998. Ecological Value of Floodplain Habitats to Razorback Suckers in the Upper Colorado River Basin. Upper Colorado River Basin Recovery Program, Denver, Colorado.

Western-yellow billed cuckoo

Johnson, M.J., A. Brand, H.C. English, C. Michaud, and B. Moore. 1999. Southwestern willow catcher and Western yellow-billed cuckoo surveys along the Colorado River (Dewey Bridge—Canyonlands National Park Northern Boundary) and Green River, Utah—Canyonlands National Park boundary) 1999. U.S. Geological Survey report to the U.S. Bureau of Reclamation and the Utah Division of Natural Resources.

Kauffman, K. 1996. Lives of North American Birds. Houghton Mifflin Company. New York, NY

U.S. Fish and Wildlife The Service. 2001. Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition To List the Yellow-billed Cuckoo (*Coccyzus americanus*) in the Western Continental United States. Fed Reg. 66 (143): 38611-38626.

APPENDIX A – BLM COMMITTED CONSERVATION MEASURES AND LEASE NOTICES

BLM-committed conservation measures, which would be incorporated into the RMP are binding species-specific measures intended to protect species, and minimize the potential for adverse impacts that may result from the implementation of BLM-authorized activities on special status species. This is not a comprehensive list, in that other modified versions of these measures may be imposed for any BLM-authorized activity following further analyses or reviews, and/or consultation and coordination with USFWS. Measures that have already been consulted on and that will be incorporated into any through consultation on existing land use plans (USFWS, 2007), oil and gas lease notices (USFW, 2004), and the Utah BLM fire management plan (USFWS 2005a: USFW 2005b).

Energy and Mineral Development

The BLM will continue to conduct project specific site inventories in areas that are proposed for energy and mineral developments. The inventories would include the presence/absence of special status species as well as suitable habitats. The BLM will work with the lessee to minimize the construction of new roads, pipelines, and other developments that require surface disturbing activities. This will assist in minimizing the effects of such activities on special status species that could adversely impact suitable habitats. It will also reduce the available access to remote locations of populations of special status species that occur on BLM-administered lands within the planning area. The BLM will continue to use Utah Threatened and Endangered Species Lease Notices. Lease notices include the following:

- Reduce impacts to wildlife and visual resources by applying the following, as appropriate:
- Directional drilling of oil and gas wells
- Drilling of multiple wells from a single pad
- Closed drilling systems
- Cluster development
- Below-ground wellheads
- Remote well monitoring
- Piping of produced liquids to centralized tank batteries off site to reduce traffic to individual wells
- Transportation and access planning (e.g., to reduce road density and traffic volumes)
- Compensatory mitigation
- Noise reduction techniques and designs
- Installation of raptor anti-perch devices in Greater sage-grouse habitat
- Monitoring of wildlife populations during drilling operations
- Avoidance of human activity between 8 p.m. and 8 a.m. from March 1 through May 15 within one-quarter mile of the perimeter of occupied Greater sage-grouse leks
- Onsite bioremediation of oil field wastes and spills
- Removal of trash, junk, waste, and other materials not in current use.

- Reclaim all disturbed surface areas promptly, performing concurrent reclamation as necessary, and minimize the total amount of all surface disturbance.
- Ensure all surface soil is stripped prior to conducting operations, stockpiled, and reapplied during reclamation, regardless of soil quality. Minimize the length of time soil remains in stockpiles and the depth or thickness of stockpiles.
- Strip and separate soil surface horizons where feasible and reapply in proper sequence during reclamation.
- Establish vegetation cover on soil stockpiles that are to be in place longer than 1 year.
- Construct and rehabilitate temporary roads to minimize total surface disturbance, consistent with intended use.
- Consider temporary measures such as silt fences, straw bales, or mulching to trap sediment in sensitive areas until reclaimed areas are stabilized with vegetation.
- Reshape to the approximate original contour all areas to be permanently reclaimed, providing for proper surface drainage.

Oil and Gas Lease Notices

Lease Notice for Mexican Spotted Owl (*Strix occidentalis lucida*)

The Lessee/Operator is given notice that the lands in this lease contain suitable habitat for Mexican spotted owl, a federally listed species. The Lessee/Operator is given notice that the lands in this lease contain Designated Critical Habitat for the Mexican spotted owl, a Federally listed species. Critical habitat was designated for the Mexican spotted owl on August 31, 2004 (69 FR 53181-53298).Avoidance or use restrictions may be placed on portions of the lease. Application of appropriate measures will depend on whether the action is temporary or permanent, and whether it occurs within or outside the owl nesting season. A temporary action is completed prior to the following breeding season, leaving no permanent structures and resulting in no permanent habitat loss. A permanent action continues for more than one breeding season and/or causes a loss of owl habitat or displaces owls through disturbances (e.g., creation of a permanent structure). The following avoidance and minimization measures have been designed to ensure activities carried out on the lease are in compliance with the Endangered Species Act (ESA). Integration of, and adherence to, these measures, will facilitate review and analysis of any submitted permits under the authority of this lease. Following these measures could reduce the scope of ESA Section 7 consultation at the permit stage. Current avoidance and minimization measures include the following:

1. Surveys will be required prior to operations, unless species occupancy and distribution information is complete and available. All surveys must be conducted by qualified individual(s).
2. Assess habitat suitability for both nesting and foraging using accepted habitat models in conjunction with field reviews. Apply the conservation measures below if project activities occur within 0.5 mile of suitable owl habitat. Determine potential effects of actions to owls and their habitat.
    a. Document type of activity, acreage and location of direct habitat impacts, type and extent of indirect impacts relative to location of suitable owl habitat.
    b. Document if the action is temporary or permanent.

3. Lease activities will require monitoring throughout the duration of the project. To ensure desired results are being achieved, minimization measures will be evaluated and, if necessary, Section 7 consultation reinitiated.
4. Water production will be managed to ensure maintenance or enhancement of riparian habitat.
5. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in canyon habitat suitable for Mexican spotted owl nesting.
6. For all temporary actions that may impact owls or suitable habitat:
    a. If the action occurs entirely outside of the owl breeding season (March 1 to August 31) and leaves no permanent structure or permanent habitat disturbance, action can proceed without an occupancy survey.
    b. If the action will occur during a breeding season, survey for owls prior to commencing activity. If owls are found, activity must be delayed until outside of the breeding season.
    c. Rehabilitate access routes created by the project through such means as raking out scars, revegetation, gating access points, etc.
7. For all permanent actions that may impact owls or suitable habitat:
    a. Survey two consecutive years for owls according to accepted protocol prior to commencing activities.
    b. If owls are found, no actions will occur within 0.5 mile of identified nest site. If nest site is unknown, no activity will occur within the designated Protected Activity Center (PAC).
    c. Avoid drilling and permanent structures within 0.5 mile of suitable habitat unless surveyed and not occupied.
    d. Reduce noise emissions (e.g., use hospital-grade mufflers) to 45 dBA at 0.5 mile from suitable habitat, including canyon rims. Placement of permanent noise-generating facilities should be determined by a noise analysis to ensure noise does not encroach upon a 0.5 mile buffer for suitable habitat, including canyon rims.
    e. Limit disturbances to and within suitable habitat by staying on approved routes.
    f. Limit new access routes created by the project.
8. Additional measures to avoid or minimize effects to the species may be developed and implemented in consultation with the U.S. Fish and Wildlife Service between the lease sale stage and lease development stage to ensure continued compliance with the ESA

Lease Notice for Southwestern Willow Flycatcher (Empidonax traillii extimus)

The Lessee/Operator is given notice that the lands in this parcel contain riparian habitat that falls within the range for southwestern willow flycatcher, a federally listed species. Avoidance or use restrictions may be placed on portions of the lease. Application of appropriate measures will depend on whether the action is temporary or permanent, and whether it occurs within or outside

the nesting season. A temporary action is completed prior to the following breeding season leaving no permanent structures and resulting in no permanent habitat loss. A permanent action continues for more than one breeding season and/or causes a loss of habitat or displaces flycatchers through disturbances (e.g., creation of a permanent structure). The following avoidance and minimization measures have been designed to ensure activities carried out on the lease are in compliance with the Endangered Species Act (ESA). Integration of, and adherence to, these measures, will facilitate review and analysis of any submitted permits under the authority of this lease. Following these measures could reduce the scope of ESA Section 7 consultation at the permit stage. Current avoidance and minimization measures include the following:

1. Surveys will be required prior to operations, unless species occupancy and distribution information is complete and available. All surveys must be conducted by qualified individual(s), and be conducted according to protocol.
2. Lease activities will require monitoring throughout the duration of the project. To ensure desired results are being achieved, minimization measures will be evaluated and, if necessary, Section 7 consultation reinitiated.
3. Water production will be managed to ensure maintenance or enhancement of riparian habitat.
4. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in suitable riparian habitat. Ensure that such directional drilling does not intercept or degrade alluvial aquifers.
5. Drilling activities will maintain a 300 ft. buffer from suitable riparian habitat year long.
6. Drilling activities within 0.25 mile of occupied breeding habitat will not occur during the breeding season of May 1 to August 15.
7. Ensure that water extraction or disposal practices do not result in change of hydrologic regime that would result in loss or degradation of riparian habitat.
8. Revegetate with native species all areas of surface disturbance within riparian areas and/or adjacent uplands. Additional measures to avoid or minimize effects to the species may be developed and implemented in consultation with the U.S. Fish and Wildlife Service between the lease sale stage and lease development stage to ensure continued compliance with the ESA.

Lease Notice for Colorado River Fish

The Lessee/Operator is given notice that the lands in this parcel contain Critical Habitat for the Colorado River fish (bonytail chub, humpback chub, Colorado pike minnow, and razorback sucker, listed as endangered under the Endangered Species Act (ESA), or these parcels have watersheds that are tributary to designated habitat. Critical habitat was designated for the four endangered Colorado River fishes on March 21, 1994 (59 FR 13374-13400). Designated critical habitat for all the endangered fishes includes those portions of the 100-year floodplain that contain primary constituent elements necessary for survival of the species. Avoidance or use restrictions may be placed on portions of the lease. The following avoidance and minimization

measures have been designed to ensure activities carried out on the lease comply with the ESA. Integration of, and adherence to, these measures will facilitate review and analysis of any submitted permits under the authority of this lease. Following these measures could reduce the scope of ESA Section 7 consultation at the permit stage. Current avoidance and minimization measures include the following:

1. Surveys will be required prior to operations, unless species occupancy and distribution information is complete and available. All surveys must be conducted by qualified individual(s).
2. Lease activities will require monitoring throughout the duration of the project. To ensure desired results are being achieved, minimization measures will be evaluated and, if necessary, Section 7 consultation reinitiated.
3. Water production will be managed to ensure maintenance or enhancement of riparian habitat.
4. Avoid loss or disturbance of riparian habitats.
5. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in suitable riparian habitat. Ensure that such directional drilling does not intercept or degrade alluvial aquifers.
6. Conduct watershed analysis for leases in designated critical habitat and overlapping major tributaries in order to determine toxicity risk from permanent facilities.
7. Implement the Utah Oil and Gas Pipeline Crossing Guidance (from BLM National Science and Technology Center).
8. Drilling will not occur within 100-year floodplains of rivers or tributaries to rivers that contain listed fish species or critical habitat.
9. In areas adjacent to 100-year flood plains, particularly in systems prone to flash floods, analyze the risk for flash floods to impact facilities, and use closed loop drilling, and pipeline burial or suspension according to the Utah Oil and Gas Pipeline Crossing Guidance, to minimize the potential for equipment damage and resulting leaks or spills. Water depletions from *any* portion of the Upper Colorado River drainage basin above Lake Powell are considered to adversely affect or adversely modify the critical habitat of the four resident endangered fish species, and must be evaluated with regard to the criteria described in the Upper Colorado River Endangered Fish Recovery Program. Formal consultation with U.S. Fish and Wildlife Service (USFWS) is required for all depletions. All depletion amounts must be reported to BLM. Additional measures to avoid or minimize effects to the species may be developed and implemented in consultation with the USFWS between the lease sale stage and lease development stage to ensure continued compliance with the ESA.

Lease Notice for Listed Plant Species

The Lessee/Operator is given notice that the lands in this parcel contain suitable habitat for federally listed plant species under the Endangered Species Act (ESA). The following avoidance

and minimization measures have been developed to facilitate review and analysis of any submitted permits under the authority of this lease:

1. Site inventories:
    a. Must be conducted to determine habitat suitability
    b. Are required in known or potential habitat for all areas proposed for surface disturbance before initiating project activities, at a time when the plant can be detected, and during appropriate flowering periods
    c. Should include documentation on individual plant locations and suitable habitat distributions
    d. Must have qualified individuals conduct all surveys.
2. Lease activities will require monitoring throughout the duration of the project. To ensure desired results are being achieved, minimization measures will be evaluated and, if necessary, Section 7 consultation reinitiated.
3. Project activities must be designed to avoid direct disturbance to populations and to individual plants:
    a. Designs will avoid concentrating water flows or sediments into plant occupied habitat.
    b. Construction will occur downslope of plants and populations where feasible; if well pads and roads must be sited upslope, buffers of 100 feet minimum between surface disturbances and plants and populations will be incorporated.
    c. Where populations occur within 200 feet of well pads, a buffer or fence will be established between the individuals or groups of individuals and the well pads during and post-construction.
    d. Areas for avoidance will be visually identifiable in the field, e.g., flagging, temporary fencing, rebar.
    e. For surface pipelines, a 10-foot buffer will be used from any plant locations:
    f. If on a slope, stabilizing construction techniques will be used to ensure the pipelines do not move toward the population.
4. For riparian/wetland-associated species; avoid loss or disturbance of riparian habitats:
    a. Water extraction or disposal practices will not result in change of hydrologic regime.
5. Disturbances to and within suitable habitat will be limited by staying on designated routes.
6. New access routes created by the project will be limited.
7. To limit OHV travel in sensitive areas, signing will be placed appropriately.
8. Dust abatement practices will be implemented near occupied plant habitat.

9. All disturbed areas will be revegetated with native species composed of species indigenous to the area.
10. Post-construction monitoring for invasive species will be required.
11. Where technically and economically feasible, directional drilling or multiple wells will be used from the same pad to reduce surface disturbance and eliminate drilling in plant habitat. Ensure that such directional drilling does not intercept or degrade alluvial aquifers.
12. Lease activities will require monitoring throughout the duration of the project. To ensure desired results are being achieved, minimization measures will be evaluated and, if necessary, Section 7 consultation reinitiated. Additional measures to avoid or minimize effects to the species may be developed and implemented in consultation with the U.S. Fish and Wildlife Service between the lease sale stage and lease development stage to ensure continued compliance with the ESA.

Lease Notice for California Condor (Gymnogyps *californianus*)

The Lessee/Operator is given notice that the lands located in this parcel contain potential habitat for the California Condor, a federally listed species. Avoidance or use restrictions may be placed on portions of the lease if the area is known or suspected to be used by condors. Application of appropriate measures will depend on whether the action is temporary or permanent, and whether it occurs within or outside potential habitat. A temporary action is completed prior to the following important season of use, leaving no permanent structures and resulting in no permanent habitat loss. This would include consideration for habitat functionality. A permanent action continues for more than one season of habitat use, and/or causes a loss of condor habitat function or displaces condors through continued disturbance (i.e. creation of a permanent structure requiring repetitious maintenance, or emits disruptive levels of noise). The following avoidance and minimization measures have been designed to ensure activities carried out on the lease are in compliance with the Endangered Species Act (ESA). Integration of, and adherence to these measures will facilitate review and analysis of any submitted permits under the authority of this lease. Following these measures could reduce the scope of ESA, Section 7 consultation at the permit stage.

Current avoidance and minimization measures include the following:

1. Surveys will be required prior to operations unless species occupancy and distribution information is complete and available. All Surveys must be conducted by qualified individual(s) approved by the BLM, and must be conducted according to approved protocol.
2. If surveys result in positive identification of condor use, all lease activities will require monitoring throughout the duration of the project to ensure desired results of applied mitigation and protection. Minimization measures will be evaluated during development and, if necessary, Section 7 consultation may be reinitiated.
3. Temporary activities within 1.0 mile of nest sites will not occur during the breeding season.

4. Temporary activities within 0.5 miles of established roosting sites or areas will not occur during the season of use, August 1 to November 31, unless the area has been surveyed according to protocol and determined to be unoccupied.
5. No permanent infrastructure will be placed within 1.0 mile of nest sites.
6. No permanent infrastructure will be placed within 0.5 miles of established roosting sites or areas.
7. Remove big game carrion to 100 feet from on lease roadways occurring within foraging range.
8. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in suitable habitat Utilize directional drilling to avoid direct impacts to large cottonwood gallery riparian habitats. Ensure that such directional drilling does not intercept or degrade alluvial aquifers.
9. Reinitiation of section 7 consultation with the Service will be sought immediately if mortality or disturbance to California condors is anticipated as a result of project activities. Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the U.S. Fish and Wildlife Service to ensure continued compliance with the ESA. Additional measures may also be employed to avoid or minimize effects to the species between the lease sale and lease development stages. These additional measures will be developed and implemented in consultation with the U.S. Fish and Wildlife Service to ensure continued compliance with the ESA.

Lease Notice for Barneby Reed Mustard (*Schoenocrabe barnebyi*)

In order to minimize effects to the federally threatened Barneby reed-mustard, the Bureau of Land Management (BLM), in coordination with the U.S. Fish and Wildlife Service (Service), has developed the following avoidance and minimization measures. Implementation of these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance operations) are in compliance with the Endangered Species Act (ESA). For the purposes of this document, the follow terms are so defined:

- *Potential habitat* is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.
- *Suitable habitat* is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Barneby reed-mustard; habitat descriptions can be found in Federal Register Notice and species recovery plan links at <http://www.fws.gov/endangered/wildlife.html>.
- *Occupied habitat* is defined as areas currently or historically known to support clay reed-mustard; synonymous with "known habitat."

The following avoidance and minimization measures should be included in the Plan of Development:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitatl prior to any ground disturbing activities (including ATV use) to determine if suitable Barneby reed-mustard habitat is present.
2. Site inventories will be conducted within suitable habitat to determine occupancy. Where standard surveys are technically infeasible and otherwise hazardous due to topography, slope, etc., suitable habitat will be assessed and mapped for avoidance (hereafter, "avoidance areas"); in such cases, in general, 300' buffers will be maintained between surface disturbance and avoidance areas. However, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat. Where conditions allow, inventories:
    a. Must be conducted by qualified individual(s) and according to BLM and Service accepted survey protocols,
    b. Will be conducted in suitable and occupied habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected (usually April 15th to June 5th, however, surveyors should verify that the plant is flowering by contacting a BLM or FWS botanist or demonstrating that the nearest known population is in flower),
    c. Will occur within 300' from the centerline of the proposed right-of-way for surface pipelines or roads; and within 300' from the perimeter of disturbance for the proposed well pad including the well pad,
    d. Will include, but not be limited to, plant species lists and habitat characteristics, and
    e. Will be valid until April 15th the following year.
3. Design project infrastructure to minimize impacts within suitable habitat:
    a. Where standard surveys are technically infeasible, infrastructure and activities will avoid all suitable habitat (avoidance areas) and incorporate 300' buffers, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,
    b. Reduce well pad size to the minimum needed, without compromising safety,
    c. Where technically and economically feasible, use directional drilling or multiple wells from the samepad,
    d. Limit new access routes created by the project,
    e. Roads and utilities should share common right-of-ways where possible,
    f. Reduce the width of right-of-ways and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,
    g. Place signing to limit off-road travel in sensitive areas, and
    h. Stay on designated routes and other cleared/approved areas.

i. All disturbed areas will be revegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

4. Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:
    a. Follow the above recommendations (#3) for project design within suitable habitats,
    b. To avoid water flow and/or sedimentation into occupied habitat and avoidance areas, silt fences, hay bales, and similar structures or practices will be incorporated into the project design; appropriate placement of fill is encouraged,
    c. Construction of roads will occur such that the edge of the right of way is at least 300' from any plant and 300' from avoidance areas,
    d. Roads will be graveled within occupied habitat; the operator is encouraged to apply water for dust abatement to such areas from April 15th to June 5th (flowering period); dust abatement applications will be comprised of water only,
    e. The edge of the well pad should be located at least 300' away from plants and avoidance areas, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,
    f. Surface pipelines will be laid such that a 300' buffer exists between the edge of the right of way and lants and 300' between the edge of right of way and avoidance areas; use stabilizing and anchoring techniques when the pipeline crosses suitable habitat to ensure pipelines don't move towards the population; site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,
    g. Construction activities will not occur from April 15th through June 5th within occupied habitat,
    h. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,
    i. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and
    j. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

5. Occupied Barneby reed-mustard habitats within 300' of the edge of the surface pipelines' right of ways, 300' of the edge of the roads' right of ways, and 300' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.

6. Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Barneby reed-mustard is anticipated as a result of project activities. Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the U.S. Fish and Wildlife Service to ensure continued compliance with the ESA.

Lease Notice for Last Chance townsendia (*Townsendia aprica*)

In order to minimize effects to the federally threatened Last Chance townsendia, the Bureau of Land Management (BLM), in coordination with the U.S. Fish and Wildlife Service (Service), has developed the following avoidance and minimization measures. Implementation of these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance operations) are in compliance with the Endangered Species Act (ESA). For the purposes of this document, the follow terms are so defined:

- *Potential habitat* is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.
- *Suitable habitat* is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Barneby reed-mustard; habitat descriptions can be found in Federal Register Notice and species recovery plan links at <http://www.fws.gov/endangered/wildlife.html>.
- *Occupied habitat* is defined as areas currently or historically known to support clay reed-mustard; synonymous with "known habitat."

The following avoidance and minimization measures should be included in the Plan of Development:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat prior to any ground disturbing activities to determine if suitable Last Chance townsendia habitat is present.
2. Site inventories will be conducted within suitable habitat to determine occupancy. Where standard surveys are technically infeasible and otherwise hazardous due to topography, slope, etc., suitable habitat will be assessed and mapped for avoidance (hereafter, "avoidance areas"); in such cases, in general, 300' buffers will be maintained between surface disturbance and avoidance areas. However, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat. Where conditions allow, inventories:
    a. Must be conducted by qualified individual(s) and according to BLM and Service accepted survey protocols,
    b. Will be conducted in suitable and occupied habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected (usually April 1st to May 30th, however, surveyors should verify that the plant is flowering by

contacting a BLM or FWS botanist or demonstrating that the nearest known population is in flower),

c. Will occur within 300' from the centerline of the proposed right-of-way for surface pipelines or roads; and within 300' from the perimeter of disturbance for the proposed well pad including the well pad,

d. Will include, but not be limited to, plant species lists and habitat characteristics, and

e. Will be valid until April 1st the following year.

3. Design project infrastructure to minimize impacts within suitable habitat:

a. Where standard surveys are technically infeasible, infrastructure and activities will avoid all suitable habitat (avoidance areas) and incorporate 300' buffers, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

b. Reduce well pad size to the minimum needed, without compromising safety,

c. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,

d. Limit new access routes created by the project,

e. Roads and utilities should share common right-of-ways where possible,

f. Reduce the width of right-of-ways and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,

g. Place signing to limit off-road travel in sensitive areas, and

h. Stay on designated routes and other cleared/approved areas.

i. All disturbed areas will be revegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

4. Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:

a. Follow the above recommendations (#3) for project design within suitable habitats,

b. To avoid water flow and/or sedimentation into occupied habitat and avoidance areas, silt fences, hay bales, and similar structures or practices will be incorporated into the project design; appropriate placement of fill is encouraged,

c. Construction of roads will occur such that the edge of the right of way is at least 300' from any plant and 300' from avoidance areas,

d. Roads will be graveled within occupied habitat; the operator is encouraged to apply water for dust abatement to such areas from April 15st to June 30th (flowering period); dust abatement applications will be comprised of water only,

e. The edge of the well pad should be located at least 300' away from plants and avoidance areas, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

f. Surface pipelines will be laid such that a 300' buffer exists between the edge of the right of way and plants and 300' between the edge of right of way and avoidance areas; use stabilizing and anchoring techniques when the pipeline crosses suitable habitat to ensure pipelines don't move towards the population; site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

g. Construction activities will not occur from April 15th through June 30th within occupied habitat,

h. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,

i. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and

j. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

5. Occupied Last Chance townsendia habitats within 300' of the edge of the surface pipelines' right of ways, 300' of the edge of the roads' right of ways, and 300' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.

6. Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Last Chance townsendia is anticipated as a result of project activities. Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the U.S. Fish and Wildlife Service to ensure continued compliance with the ESA.

Lease Notice for Wright Fishhook Cactus (*Sclerocactus wrightiae*)

In order to minimize effects to the federally endangered Wright fishhook cactus, the Bureau of Land Management (BLM), in coordination with the U.S. Fish and Wildlife Service (Service), has developed the following avoidance and minimization measures. Implementation of these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance operations) are in compliance with the Endangered Species Act (ESA). For the purposes of this document, the follow terms are so defined:

- *Potential habitat* is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.

- *Suitable habitat* is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Barneby reed-mustard; habitat descriptions can be found in Federal Register Notice and species recovery plan links at <http://www.fws.gov/endangered/wildlife.html>.
- *Occupied habitat* is defined as areas currently or historically known to support clay reed-mustard; synonymous with "known habitat."

The following avoidance and minimization measures should be included in the Plan of Development:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat prior to any ground disturbing activities to determine if suitable Wright fishhook cactus habitat is present.
2. Within suitable habitat, site inventories will be conducted to determine occupancy. Where standard surveys are technically infeasible and otherwise hazardous due to topography, slope, etc., suitable habitat will be assessed and mapped for avoidance (hereafter, "avoidance areas"); in such cases, in general, 300' buffers will be maintained between surface disturbance and avoidance areas. However, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat. Inventories:
    a. Must be conducted by qualified individual(s) approved by BLM using accepted survey protocols,
    b. Will be conducted in suitable and occupied habitat for all areas proposed for surface
    c. disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected and during appropriate flowering periods. Inventories should be conducted between April 1st to June 15th, however, surveyors should verify that the plant is flowering by contacting a BLM or FWS botanist or demonstrating that the nearest known population is in flower,
    d. Will occur within 300' from the centerline of the proposed right-of-way for surface pipelines or roads; and within 300' from the perimeter of disturbance for the proposed well pad including the well pad,
    e. Will include, but not be limited to, plant species lists and habitat characteristics, and
    f. Will be valid until April 1st the following year.
3. Design project infrastructure to minimize impacts within suitable habitat:
    a. Where standard surveys are technically infeasible, infrastructure and activities will avoid all suitable habitat (avoidance areas) and incorporate 300' buffers, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,
    b. Reduce well pad size to the minimum needed, without compromising safety,

c. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,

d. Limit new access routes created by the project,

e. Roads and utilities should share common right-of-ways where possible,

f. Reduce the width of right-of-ways and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,

g. Place signing to limit off-road travel in sensitive areas, and

h. Stay on designated routes and other cleared/approved areas.

i. All disturbed areas will be revegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

4. Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:

a. Follow the above recommendations (#3) for project design within suitable habitats,

b. To avoid water flow and/or sedimentation into occupied habitat and avoidance areas, silt fences, hay bales, and similar structures or practices will be incorporated into the project design; appropriate placement of fill is encouraged,

c. Construction of roads will occur such that the edge of the right of way is at least 300' from any plant and 300' from avoidance areas,

d. Roads will be graveled within occupied habitat; the operator is encouraged to apply water for dust abatement to such areas from April 1st to June 15th (flowering period); dust abatement applications will be comprised of water only,

e. The edge of the well pad should be located at least 300' away from plants and avoidance areas, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

f. Surface pipelines will be laid such that a 300' buffer exists between the edge of the right of way and plants and 300' between the edge of right of way and avoidance areas; use stabilizing and anchoring techniques when the pipeline crosses suitable habitat to ensure pipelines don't move towards the population; site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

g. Construction activities will not occur from April 1st through June 15th within occupied habitat,

h. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,

i. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and

j. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

5. Occupied Wright fishhook cactus habitats within 300' of the edge of the surface pipelines' right-of-ways, 300' of the edge of the roads' right-of-ways, and 300' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.
6. Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Wright fishhook cactus is anticipated as a result of project activities. Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation.

Lease Notice for Winkler Pincushion Cactus (*Pediocactus winkleri*)

In order to minimize effects to the federally threatened Winkler pincushion cactus, the Bureau of Land Management (BLM), in coordination with the U.S. Fish and Wildlife Service (Service), has developed the following avoidance and minimization measures. Implementation of these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance operations) are in compliance with the Endangered Species Act (ESA). For the purposes of this document, the follow terms are so defined:

- *Potential habitat* is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.
- *Suitable habitat* is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Barneby reed-mustard; habitat descriptions can be found in Federal Register Notice and species recovery plan links at <http://www.fws.gov/endangered/wildlife.html>.
- *Occupied habitat* is defined as areas currently or historically known to support clay reed-mustard; synonymous with "known habitat."

The following avoidance and minimization measures should be included in the Plan of Development:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat prior to any ground disturbing activities to determine if suitable Winkler pincushion cactus habitat is present.
2. Within suitable habitat, site inventories will be conducted to determine occupancy. Where standard surveys are technically infeasible and otherwise hazardous due to topography, slope, etc., suitable habitat will be assessed and mapped for avoidance (hereafter, "avoidance areas"); in such cases, in general, 300' buffers will be maintained

between surface disturbance and avoidance areas. However, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat. Inventories:

a. Must be conducted by qualified individual(s) approved by BLM using accepted survey protocols,

b. Will be conducted in suitable and occupied*1* habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected, and during appropriate flowering periods. Inventories should be conducted between March 15th to June 1st, however, surveyors should verify that the plant is flowering by contacting a BLM or FWS botanist or demonstrating that the nearest known population is in flower,

c. Will occur within 300' from the centerline of the proposed right-of-way for surface pipelines or roads; and within 300' from the perimeter of disturbance for the proposed well pad including the well pad,

d. Will include, but not be limited to, plant species lists and habitat characteristics, and

e. Will be valid until March 15th the following year.

3. Design project infrastructure to minimize impacts within suitable habitat:

a. Where standard surveys are technically infeasible, infrastructure and activities will avoid all suitable habitat (avoidance areas) and incorporate 300' buffers, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

b. Reduce well pad size to the minimum needed, without compromising safety,

c. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,

d. Limit new access routes created by the project,

e. Roads and utilities should share common right-of-ways where possible,

f. Reduce the width of right-of-ways and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,

g. Place signing to limit off-road travel in sensitive areas, and

h. Stay on designated routes and other cleared/approved areas.

i. All disturbed areas will be revegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

4. Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:

a. Follow the above recommendations (#3) for project design within suitable habitats,

b. To avoid water flow and/or sedimentation into occupied habitat and avoidance areas, silt fences, hay bales, and similar structures or practices will be incorporated into the project design; appropriate placement of fill is encouraged,

c. Construction of roads will occur such that the edge of the right of way is at least 300' from any plant and 300' from avoidance areas,

d. Roads will be graveled within occupied habitat; the operator is encouraged to apply water for dust abatement to such areas from March 15th to June 1st (flowering period); dust abatement applications will be comprised of water only,

e. The edge of the well pad should be located at least 300' away from plants and avoidance areas, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

f. Surface pipelines will be laid such that a 300' buffer exists between the edge of the right of way and plants and 300' between the edge of right of way and avoidance areas; use stabilizing and anchoring techniques when the pipeline crosses suitable habitat to ensure pipelines don't move towards the population; site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

g. Construction activities will not occur from March 15th through June 1st within occupied habitat,

h. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,

i. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and

j. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

5. Occupied Winkler pincushion cactus habitats within 300' of the edge of the surface pipelines' right-of ways, 300' of the edge of the roads' right-of-ways, and 300' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.

6. Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Winkler pincushion cactus is anticipated as a result of project activities. Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the U.S. Fish and Wildlife Service to ensure continued compliance with the ESA.

Lease Notice for the San Rafael Cactus (Pediocactus despainii)

In order to minimize effects to the federally endangered San Rafael cactus, the Bureau of Land Management (BLM) in coordination with the U.S. Fish and Wildlife Service (Service), have developed the following avoidance and minimization measures. Integration of and adherence to these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance) are in compliance with the Endangered Species Act (ESA). The following avoidance and minimization measures should be included in the Plan of Development:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat*2* prior to any ground disturbing activities to determine if suitable San Rafael cactus habitat is present.
2. Within suitable habitat, site inventories will be conducted to determine occupancy. Inventories:
    a. Must be conducted by qualified individual(s) approved by BLM using accepted survey protocols,
    b. Will be conducted in suitable and occupied habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected, and during appropriate flowering periods. Inventories should be conducted between March 15th to June 1st, unless extended by the BLM
    c. Will occur within 300' from the centerline of the proposed right-of-way for surface pipelines or roads; and within 100' from the perimeter of disturbance for the proposed well pad including the well pad,
    d. Will include, but not be limited to, plant species lists and habitat characteristics, and
    e. Will be valid until March 15th the following year.
3. Design project infrastructure to minimize impacts within suitable habitat:
    a. Reduce well pad size to the minimum needed, without compromising safety,
    b. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,
    c. Limit new access routes created by the project,
    d. Roads and utilities should share common right-of-ways where possible,
    e. Reduce width of right-of-ways and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,
    f. Place signing to limit off-road travel in sensitive areas,
    g. Stay on designated routes and other cleared/approved areas, and

h. All disturbed areas will be re-vegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

4. Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:
    a. Follow the above (#3) recommendations for project design within suitable habitats,
    b. Buffers of 100 feet minimum between the edge of the right of way (roads and surface pipelines) or surface disturbance (well pads) and plants and populations will be incorporated,
    c. Surface pipelines will be laid such that a 100 foot buffer exists between the edge of the right of way and the plants, use stabilizing and anchoring techniques when the pipeline crosses the habitat to ensure the pipelines don't move towards the population,
    d. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,
    e. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,
    f. Designs will avoid concentrating water flows or sediments into occupied habitat,
    g. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and
    h. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.
5. Occupied San Rafael cactus habitats within 100' of the edge of the surface pipelines' right-of-ways, 100' of the edge of the roads' right-of-ways, and 100' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.
6. Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the San Rafael cactus is anticipated as a result of project activities. Additional site-specific measures may also be employed to avoid or minimize effects to the species.

Lease Notice for the Maguire daisy (*Erigeron maguirei*)

In order to minimize effects to the federally threatened Maguire Daisy, the Bureau of Land Management (BLM), in coordination with the U.S. Fish and Wildlife Service (Service), has developed the following avoidance and minimization measures. Implementation of these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance operations) are in compliance with the

Endangered Species Act (ESA). For the purposes of this document, the follow terms are so defined:

- *Potential habitat* is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.
- *Suitable habitat* is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Barneby reed-mustard; habitat descriptions can be found in Federal Register Notice and species recovery plan links at <http://www.fws.gov/endangered/wildlife.html>.
- *Occupied habitat* is defined as areas currently or historically known to support clay reed-mustard; synonymous with "known habitat."

The following avoidance and minimization measures should be included in the Plan of Development:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat1 prior to any ground disturbing activities to determine if suitable Maguire Daisy habitat is present.
2. Site inventories will be conducted within suitable habitat to determine occupancy. Where standard surveys are technically infeasible and otherwise hazardous due to topography, slope, etc., suitable habitat will be assessed and mapped for avoidance (hereafter, —avoidance areas); in such cases, in general, 300' buffers will be maintained between surface disturbance and avoidance areas. However, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat. Where conditions allow, inventories:
    a. Must be conducted by qualified individual(s) and according to BLM and Service accepted survey protocols,
    b. Will be conducted in suitable and occupied habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected (usually May 1st to June 30th, however, surveyors should verify that the plant is flowering by contacting a BLM or FWS botanist or demonstrating that the nearest known population is in flower),
    c. Will occur within 300' from the centerline of the proposed right-of-way for surface pipelines or roads; and within 300' from the perimeter of disturbance for the proposed well pad including the well pad,
    d. Will include, but not be limited to, plant species lists and habitat characteristics, and
    e. Will be valid until May 1st the following year.
3. Design project infrastructure to minimize impacts within suitable habitat:
    a. Where standard surveys are technically infeasible, infrastructure and activities will avoid all suitable habitat (avoidance areas) and incorporate 300' buffers, in

general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

b. Reduce well pad size to the minimum needed, without compromising safety,

c. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,

d. Limit new access routes created by the project,

e. Roads and utilities should share common right-of-ways where possible,

f. Reduce the width of right-of-ways and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,

g. Place signing to limit off-road travel in sensitive areas, and

h. Stay on designated routes and other cleared/approved areas.

i. All disturbed areas will be revegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

4. Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:

a. Follow the above recommendations (#3) for project design within suitable habitats,

b. To avoid water flow and/or sedimentation into occupied habitat and avoidance areas, silt fences, hay bales, and similar structures or practices will be incorporated into the project design; appropriate placement of fill is encouraged,

c. Construction of roads will occur such that the edge of the right of way is at least 300' from any plant and 300' from avoidance areas,

d. Roads will be graveled within occupied habitat; the operator is encouraged to apply water for dust abatement to such areas from May 1st to June 30th (flowering period); dust abatement applications will be comprised of water only,

e. The edge of the well pad should be located at least 300' away from plants and avoidance areas, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

f. Surface pipelines will be laid such that a 300' buffer exists between the edge of the right of way and plants and 300' between the edge of right of way and avoidance areas; use stabilizing and anchoring techniques when the pipeline crosses suitable habitat to ensure pipelines don't move towards the population; site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,

g. Construction activities will not occur from May 1st through June 30th within occupied habitat,

h. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,

i. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and k. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

5. Occupied Maguire Daisy habitats within 300' of the edge of the surface pipelines' right of ways, 300' of the edge of the roads' right of ways, and 300' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.

6. Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Maguire Daisy is anticipated as a result of project activities. Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the U.S. Fish and Wildlife Service to ensure continued compliance with the ESA.

Lease Notice for the Jones cycladenia (*Cycladenia humilis* var. *jonesii*)

In order to minimize effects to the federally threatened Jones cycladenia, the Bureau of Land Management (BLM), in coordination with the U.S. Fish and Wildlife Service (Service), has developed the following avoidance and minimization measures. Implementation of these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance operations) are in compliance with the endangered Species Act (ESA). For the purposes of this document, the follow terms are so defined:

- *Potential habitat* is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.
- *Suitable habitat* is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Barneby reed-mustard; habitat descriptions can be found in Federal Register Notice and species recovery plan links at <http://www.fws.gov/endangered/wildlife.html>.
- *Occupied habitat* is defined as areas currently or historically known to support clay reed-mustard; synonymous with "known habitat."

The following avoidance and minimization measures should be included in the Plan of Development:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat prior to any ground disturbing activities to determine if suitable Jones cycladenia habitat is present.
2. Site inventories will be conducted within suitable habitat to determine occupancy. Where standard surveys are technically infeasible and otherwise hazardous due to topography, slope, etc., suitable habitat will be assessed and mapped for avoidance (hereafter, —avoidance areas); in such cases, in general, 300' buffers will be maintained between surface disturbance and avoidance areas. However, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat. Where conditions allow, inventories:
    a. Must be conducted by qualified individual(s) and according to BLM and Service accepted survey protocols,
    b. Will be conducted in suitable and occupied habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected (usually May 15st to June 30th, however, surveyors should verify that the plant is flowering by contacting a BLM or FWS botanist or demonstrating that the nearest known population is in flower),
    c. Will occur within 300' from the centerline of the proposed right-of-way for surface pipelines or roads; and within 300' from the perimeter of disturbance for the proposed well pad including the well pad,
    d. Will include, but not be limited to, plant species lists and habitat characteristics, and
    e. Will be valid until May 1st the following year.
3. Design project infrastructure to minimize impacts within suitable habitat:
    a. Where standard surveys are technically infeasible, infrastructure and activities will avoid all suitable habitat (avoidance areas) and incorporate 300' buffers, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,
    b. Reduce well pad size to the minimum needed, without compromising safety,
    c. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,
    d. Limit new access routes created by the project,
    e. Roads and utilities should share common right-of-ways where possible,
    f. Reduce the width of right-of-ways and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,
    g. Place signing to limit off-road travel in sensitive areas, and
    h. Stay on designated routes and other cleared/approved areas.

i. All disturbed areas will be revegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

4. Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:
    a. Follow the above recommendations (#3) for project design within suitable habitats,
    b. To avoid water flow and/or sedimentation into occupied habitat and avoidance areas, silt fences, hay bales, and similar structures or practices will be incorporated into the project design; appropriate placement of fill is encouraged,
    c. Construction of roads will occur such that the edge of the right of way is at least 300' from any plant and 300' from avoidance areas,
    d. Roads will be graveled within occupied habitat; the operator is encouraged to apply water for dust abatement to such areas from May 15th to June 30th (flowering period); dust abatement applications will be comprised of water only,
    e. The edge of the well pad should be located at least 300' away from plants and avoidance areas, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,
    f. Surface pipelines will be laid such that a 300' buffer exists between the edge of the right of way and plants and 300' between the edge of right of way and avoidance areas; use stabilizing and anchoring techniques when the pipeline crosses suitable habitat to ensure pipelines don't move towards the population; site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat,
    g. Construction activities will not occur from May 15th through June 30th within occupied habitat,
    h. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,
    i. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and k. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

5. Occupied Jones cycladenia habitats within 300' of the edge of the surface pipelines' right of ways, 300' of the edge of the roads' right of ways, and 300' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.

6. Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Jones cycladenia is anticipated as a result of project activities. Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the U.S. Fish and Wildlife Service to ensure continued compliance with the ESA.

Lease Notice for the Uinta Basin hookless cactus (*Sclerocactus glaucus*)

In order to minimize effects to the federally threatened Uinta Basin hookless cactus, the Bureau of Land Management (BLM) in coordination with the U.S. Fish and Wildlife Service (Service), developed the following avoidance and minimization measures. Integration of and adherence to these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance) are in compliance with the Endangered Species Act (ESA). The following avoidance and minimization measures should be included in the Plan of Development:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat prior to any ground disturbing activities to determine if suitable Uinta Basin hookless cactus habitat is present.
2. Within suitable habitat, site inventories will be conducted to determine occupancy. Inventories:
    a. Must be conducted by qualified individual(s) and according to BLM and Service accepted survey protocols,
    b. Will be conducted in suitable and occupied4 habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected, and during appropriate flowering periods:
        i. *Sclerocactus brevispinus* surveys should be conducted March 15th to June 30th, unless extended by the BLM
        ii. *Sclerocactus wetlandicus* surveys can be done any time of the year, provided there is no snow cover,
    c. Will occur within 115' from the centerline of the proposed right-of-way for surface pipelines or roads; and within 100' from the perimeter of disturbance for the proposed well pad including the well pad,
    d. Will include, but not be limited to, plant species lists and habitat characteristics, and
    e. Will be valid until March 15th the following year for *Sclerocactus brevispinus* and one year from the survey date for *Sclerocactus wetlandicus*.
3. Design project infrastructure to minimize impacts within suitable habitat:
    a. Reduce well pad size to the minimum needed, without compromising safety,
    b. Limit new access routes created by the project,

c. Roads and utilities should share common right-of-ways where possible,

d. Reduce width of right-of-ways and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,

e. Place signing to limit off-road travel in sensitive areas,

f. Stay on designated routes and other cleared/approved areas, and

g. All disturbed areas will be re-vegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

4. Within occupied habitat3, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:

   a. Follow the above (#3) recommendations for project design within suitable habitats,

   b. Buffers of 100 feet minimum between the edge of the right of way (roads and surface pipelines) or surface disturbance (well pads) and plants and populations will be incorporated,

   c. Surface pipelines will be laid such that a 100 foot buffer exists between the edge of the right of way and the plants, use stabilizing and anchoring techniques when the pipeline crosses the habitat to ensure the pipelines don't move towards the population,

   d. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,

   e. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,

   f. Designs will avoid concentrating water flows or sediments into occupied habitat,

   g. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and

   h. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

5. Occupied Uinta Basin hookless cactus habitats within 100' of the edge of the surface pipelines' right-of-ways, 100' of the edge of the roads' right-of-ways, and 100' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.

6. Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Uinta Basin hookless cactus is anticipated as a result of project activities.

Resource Protection Measures Identified in the Utah Land Use Plan Amendment for Fire and Fuels Management

The project proponent commits to the following resource protection measures as identified in the March 4, 2005 Biological Assessment. These measures have been developed as part of the proposed action to provide statewide consistency in reducing the effects of fire management activities on listed, proposed, and candidate species and their habitats. Resource protection measures for fire management practices use the following codes to represent which actions fall within each of the measures:

SUP: wildland fire suppression,
WFU: wildland fire use for resource benefit,
RX: prescribed fire,
NF: non-fire fuel treatments,
ESR: Emergency Stabilization and Rehabilitation

Measures designed to protect air quality include:

A-1 Evaluate weather conditions, including wind speed and atmospheric stability, to predict impacts from smoke from prescribed fires and wildland fire uses. Coordinate with Utah Department of Environmental Quality for prescribed fires and wildland fire use (RX, WFU).

A-2 When using chemical fuels reduction methods, follow all label requirements for herbicide application (NF).

Measures designed to protect soil and water quality include:

SW-1 Avoid heavy equipment use on highly erosive soils (soils with low soil loss tolerance), wet or boggy soils and slopes greater than 30%, unless otherwise analyzed and allowed under appropriate NEPA evaluation with implementation of additional erosion control and other soil protection mitigation measures. (SUP, WFU, RX, NF, ESR)

SW-2 There may be situations where high intensity fire will occur on sensitive and erosive soil types during wildland fire, wildland fire use or prescribed fire. If significant areas show evidence of high severity fire, then evaluate area for soil erosion potential and downstream values at risk and implement appropriate or necessary soil stabilization actions such as mulching or seeding to avoid excessive wind and water erosion. (SUP,WFU, RX)

SW-3 Complete necessary rehabilitation on fire lines or other areas of direct soil disturbance, including but not limited to water barring fire lines, covering and mulching fire lines with slash, tilling and/or sub soiling compacted areas, scarification of vehicle tracks, OHV closures, seeding and/or mulching for erosion protection. (SUP, WFU, RX)

SW-4 When using mechanical fuels reduction treatments, limit tractor and heavy equipment use to periods of low soil moisture to reduce the risk of soil compaction. If this is not practical, evaluate sites, post treatment and if necessary, implement appropriate remediation, such as sub soiling, as part of the operation. (NF)

SW-5 Treatments such as chaining, plowing and roller chopping shall be conducted as much as practical on the contour to reduce soil erosion. (NF, ESR)

SW-6 When using chemical fuel reduction treatments follow all label directions, additional mitigations identified in project NEPA evaluation and the Approved Pesticide Use Permit. At a minimum, provide a 100-foot-wide riparian buffer strip for aerial application, 25 feet for vehicle application and 10 feet for hand application. Any deviations must be accordance with the label. Herbicides would be applied to individual plants within 10 feet of water where application is critical. (NF)

SW-7 Avoid heavy equipment in riparian or wetland areas. During fire suppression or wildland fire use, consult a Resource Advisor before using heavy equipment in riparian or wetland areas. (SUP, WFU, RX, NF, ESR)

SW-8 Limit ignition within native riparian or wetland areas. Allow low-intensity fire to burn into riparian areas. (RX)

SW-9 Suppress wildfires consistently with compliance strategies for restoring or maintaining the restoration of water quality impaired [303(d) listed] water bodies. Do not use retardant within 300 feet of water bodies. (SUP, WFU)

SW-10 Plan and implement projects consistent with compliance strategies for restoring or maintaining the restoration of water quality impaired [303(d) listed] water bodies. Planned activities should take into account the potential impacts on water quality, including increased water yields that can threaten fisheries and aquatic habitat; improvements at channel crossings; channel stability; and downstream values. Of special concern are small headwaters of moderate to steep watersheds, erosive or saline soils; multiple channel crossings; at-risk fisheries, and downstream residents. (RX, NF, ESR)

Measures designed to protect vegetation include:

V-1 When restoring or rehabilitating disturbed rangelands, non-intrusive, non-native plant species are appropriate for use when native species: (1) are not available; (2) are not economically feasible; (3) cannot achieve ecological objectives as well as non-native species; and/or (4) cannot compete with already established native species. (RX, NF, ESR)

V-2 In areas known to have weed infestations, aggressive action should be taken in rehabilitating fire lines, seeding and follow-up monitoring and treatment to reduce the spread of noxious weeds. Monitor burned areas and treat as necessary. All seed used would be tested for purity and for noxious weeds. Seed with noxious weeds would be rejected. (SUP, WFU, RX, NF, ESR)

Measures designed to protect special status species (including threatened and endangered species) include:

SSS-1 Initiate emergency Section 7 consultation with United States Fish and Wildlife Service (Service) upon the determination that wildfire suppression may pose a potential threat to any listed threatened or endangered species or adverse modification of designated critical habitat. (SUP)

SSS-2 Prior to planned fire management actions, survey for listed threatened, endangered, and non-listed sensitive species. Initiate Section 7 consultation with the Service as necessary if a proposed project may affect any listed species. Review appropriate management, conservation and recovery plans and include recovery plan direction into project proposals. For non-listed special status plant and animal species, follow the direction contained in the BLM 6840 Manual. Ensure that any proposed project conserves nonlisted sensitive species and their habitats and ensure that any action authorized, funded, or carried out by BLM does not contribute to the need for any species to become listed. (RX, NF, ESR)

SSS-3 Incorporate site-specific conservation measures identified in this BA. (SUP, WFU, RX,NF, ESR)

Measures designed to protect fish and wildlife resources include:

FW-1 Avoid treatments during nesting, fawning, spawning, or other critical periods for wildlife or fish. (RX, NF, ESR)

FW-2 Avoid if possible or limit the size of, wildland fires in important wildlife habitats such as, mule deer winter range, riparian and occupied sage grouse habitat. Use Resource Advisors to help prioritize resources and develop Wildland Fire Situation Analyses (WFSAs) and Wildland Fire Implementation Analyses (WFSAs) and Wildland Fire Implementation Plans (WFIPs) when important habitats may be impacted. (SUP, WFU)

FW-3 Minimize wildfire size and frequency in sagebrush communities where sage grouse habitat objectives will not be met if a fire occurs. Prioritize wildfire suppression in sagebrush habitat with an understory of invasive, annual species. Retain unburned islands and patches of sagebrush unless there are compelling safety, private property and resource protection or control objectives at risk. Minimize burn out operations (to minimize burned acres) in occupied sage-grouse habitats when there are not threats to human life and/or important resources. (SUP)

FW-4 Establish fuel treatment projects at strategic locations to minimize size of wildfires and to limit further loss of sagebrush. Fuel treatments may include green stripping to help reduce the spread of wildfires into sagebrush communities. (RX, NF)

FW-5 Use wildland fire to meet wildlife objectives. Evaluate impacts to sage grouse habitat in areas where wildland fire use for resource benefit may be implemented. (WFU, RX)

FW-6 Create small openings in continuous or dense sagebrush (>30% canopy cover) to create a mosaic of multiple-age classes and associated understory diversity across the landscape to benefit sagebrush-dependent species. (WFU, RX, NF)

FW-7 On sites that are currently occupied by forests or woodlands, but historically supported sagebrush communities, implement treatments (fire, cutting, chaining, seeding, etc.) to reestablish sagebrush communities. (RX, NF)

FW-8 Evaluate and monitor burned areas and continue management restrictions until the recovering and/or seeded plant community reflect the desired condition. (SUP, WFU, RX, ESR)

FW-9 Utilize the Emergency Stabilization and Rehabilitation program to apply appropriate post fire treatments within crucial wildlife habitats, including sage grouse habitats. Minimize seeding with non-native species that may create a continuous perennial grass cover and restrict establishment of native vegetation. Seed mixtures should be designed to reestablish important seasonal habitat components for sage grouse. Leks should not be reseeded with plants that change the vegetation heights previously found on the lek. Forbs should be stressed in early and late brood-rearing habitats. In situations of limited funds for emergency stabilization and rehabilitation actions, prioritize rehabilitation of sage grouse habitats. (ESR)

Measures designed to protect wild horses and burros include:

WHB-1 Avoid fencing that would restrict access to water. (RX, NF, ESR)

Measures designed to protect cultural resources include:

CR-1 Cultural Resource Advisors should be contacted when fires occur in areas containing sensitive cultural resources. (SUP)

CR-2 Wildland fire use is discouraged in areas containing sensitive cultural resources. A

Programmatic Agreement is being prepared between the Utah State Historic Preservation Office, BLM, and the Advisory Council to cover the finding of adverse effects to cultural resources associated with wildland fire use. (WFU)

CR-3 Potential impacts of proposed treatments should be evaluated for compliance with the National Historic Preservation Act (NHPA) and the Utah Statewide Protocol. This should be conducted prior to the proposed treatment. (RX, NF, ESR)

Measures designed to protect paleontology resources include:

P-1 Planned projects should be consistent with BLM Manual and Handbook H-8270-1, Chapter III (A) and III (B) to avoid areas where significant fossils are known or predicted to occur or to provide for other mitigation of possible adverse effects. (RX, NF, ESR)

P-2 In the event that paleontological resources are discovered in the course of surface fire management activities, including fires suppression, efforts should be made to protect these resources. (SUP, WFU, RX, NF, ESR)

Measures designed to protect forestry resources include:

F-1 Planned projects should be consistent with HFRA Section 102(e)(2) to maintain or contribute to the restoration of old-growth stands to a pre-fire suppression condition and to retain large trees contributing to old-growth structure. (SUP, WFU, RX, NF)

F-2 During planning, evaluate opportunities to utilize forest and woodland products prior to implementing prescribed fire activities. Include opportunities to use forest and woodland stands, consider developing silvicultural prescriptions concurrently with fuel treatments prescriptions. (RX, NF)

Measures designed to protect livestock grazing resources include:

LG-1 Coordinate with permittees regarding the requirements for non-use or rest of treated areas. (SUP, WFU, RX, NF, ESR)

LG-2 Rangelands that have been burned by wildfire, prescribed fire, or wildland fire use, would be ungrazed for a minimum of one complete growing season following the burn. (SUP, WFU, RX)

LG-3 Rangelands that have been re-seeded or otherwise treated to alter vegetation composition, chemically or mechanically, would be ungrazed for a minimum of two complete growing seasons. (RX, NF, ESR)

Measures designed to protect recreation and visitor services include:

Rec-1 Wildland fire suppression efforts would preferentially protect Special Recreation Management Areas and recreation site infrastructure in line with fire management goals and objectives. (SUP)

Rec-2 Vehicle tracks created off of established routes would be obliterated after fire management actions in order to reduce unauthorized OHV travel. (SUP, WFU, RX, NF, ESR)

Measures designed to protect land and reality resources include:

LR-1 Fire management practices would be designed to avoid or otherwise ensure the protection of authorized rights-of-way and other facilities located on the public lands, including coordination with holders of major rights-of-way systems within rights-of-way corridors and communication sites. (WFU, RX, NF, ESR)

LR-2 Fire management actions must not destroy, deface, change or remove to another place any monument or witness tree of the Public Land Survey System. (SUP, WFU, RX, NF,ESR)

Measures designed to minimize impacts confounded by hazardous waste include:

HW-1 Recognize hazardous wastes and move fire personnel to a safe distance from dumped chemicals, unexploded ordnance, drug labs, wire burn sites, or any other hazardous wastes. Immediately notify BLM Field Office hazmat coordinator or state hazmat coordinator upon discovery of any hazardous materials, following the BLM hazardous materials contingency plan. (SUP, WFU, RX, NF, ESR)

Measures designed to protect mineral resources include:

M-1 A safety buffer should be maintained between fire management activities and at-risk facilities. (SUP, WFU, RX)

Measures designed to protect wilderness and wilderness study areas (WSAs) include:

Wild-1 The use of earth-moving equipment must be authorized by the field office manager. (SUP, WFU, RX, ESR)

Wild-2 Fire management actions would rely on the most effective methods of suppression that are least damaging to wilderness values, other resources and the environment, while requiring the least expenditure of public funds. (SUP, WFU)

Wild-3 A Resource Advisor should be consulted when fire occurs in Wilderness and WSAs.(SUP, WFU)

Conservation Measures from the Biological Opinion for the Utah BLM Land Use Plans Amendments BA

Mexican Spotted Owl (*Strix occidentalis lucida*)

The following list of measures provides species-specific guidance, intended to avoid, minimize, or reduce potential adverse impacts from implementation of BLM actions on the Mexican spotted owl (*Strix occidentalis lucida*). This list is not comprehensive. Additional conservation measures, or other modified versions of these measures, may be applied for any given BLM-authorized activity upon further analysis, review, coordination efforts, and/or appropriate levels of section 7 consultation with the Service. 1. BLM will place restrictions on all authorized (permitted) activities that may adversely affect the Mexican spotted owl in identified PACs, breeding habitat, or designated critical habitat, to reduce the potential for adverse impacts to the species. Restrictions and procedures have been adapted from guidance published in the Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances (USFWS 2002b), as well as coordination between BLM and the Service. Measures include:

1. Surveys, according to USFWS protocol, will be required prior to any disturbance related activities that have been identified to have the potential to impact Mexican spotted owl, unless current species occupancy and distribution information is complete and available. All surveys must be conducted by USFWS certified individuals, and approved by the BLM authorized officer.
2. Assess habitat suitability for both nesting and foraging using accepted habitat models in conjunction with field reviews. Apply the appropriate conservation measures below if project activities occur within 0.5 mile of suitable owl habitat, dependent in part on if the action is temporary or permanent: For all temporary actions that may impact owls or suitable habitat:
    - If action occurs entirely outside of the owl breeding season, and leaves no permanent structure or permanent habitat disturbance, action can proceed without an occupancy survey.
    - If action will occur during a breeding season, survey for owls prior to commencing activity. If owls are found, activity should be delayed until outside of the breeding season.
    - Eliminate access routes created by a project through such means as raking out scars, revegetation, gating access points, etc. For all permanent actions that may impact owls or suitable habitat:
    - Survey two consecutive years for owls according to established protocol prior to commencing of activity.

- If owls are found, no actions will occur within 0.5 mile of identified nest site.
- If nest site is unknown, no activity will occur within the designated Protected Activity Center (PAC).
- Avoid placing permanent structures within 0.5 mi of suitable habitat unless surveyed and not occupied.
- Reduce noise emissions (e.g., use hospital-grade mufflers) to 45 dBA at 0.5 mile from suitable habitat, including canyon rims (Delaney et al. 1997). Placement of permanent noise-generating facilities should be determined by a noise analysis to ensure noise does not encroach upon a 0.5 mile buffer for suitable habitat, including canyon rims.
- Limit disturbances to and within suitable owl habitat by staying on designated routes.
- Limit new access routes created by the project. 2. BLM will, as a condition of approval (COA) on any project proposed within identified PACs, designated critical habitat, or within spatial buffers for Mexican spotted owl nests (0.5 mile), ensure that project proponents are notified as to their responsibilities for rehabilitation of temporary access routes and other temporary surface disturbances, created by their project, according to individual BLM Field Office standards and procedures, or those determined in the project-specific Section 7 Consultation.

3. BLM will require monitoring of activities in designated critical habitat, identified PACs, or breeding habitats, wherein it has been determined that there is a potential for take. If any adverse impacts are observed to occur in a manner, or to an extent that was not considered in the project-specific Section 7 Consultation, then consultation must be reinitiated.
    - Monitoring results should document what, if any, impacts to individuals or habitat occur during project construction/implementation. In addition, monitoring should document successes or failures of any impact minimization, or mitigation measures. Monitoring results would be considered an opportunity for adaptive management, and as such, would be carried forward in the design and implementation of future projects.
4. For all survey and monitoring actions:
    - Reports must be provided to affected field offices within 15 days of completion of survey or monitoring efforts.
    - Report any detection of Mexican spotted owls during survey or monitoring to the authorized officer within 48 hours.
5. BLM will, in areas of designated critical habitat, ensure that any physical or biological factors (i.e., the primary constituent elements), as identified in determining and designating such habitat, remains intact during implementation of any BLM-authorized activity.

6. For all BLM actions that —may adversely affect the primary constituent elements in any suitable Mexican spotted owl habitat, BLM will implement measures as appropriate to minimize habitat loss or fragmentation, including rehabilitation of access routes created by the project through such means as raking out scars, revegetation, gating access points, etc.
7. Where technically and economically feasible, use directional drilling from single drilling pads to reduce surface disturbance, and minimize or eliminate needing to drilling in canyon habitats suitable for Mexican spotted owl nesting.
8. Prior to surface disturbing activities in Mexican spotted owl PACs, breeding habitats, or designated critical habitat, specific principles should be considered to control erosion. These principles include:
    - Conduct long-range transportation and access planning for large areas to ensure that roads will serve future needs. This will result in less total surface disturbance.
    - Avoid surface disturbance in areas with high erosion hazards to the greatest extent possible. Avoid mid-slope locations, headwalls at the source of tributary drainages, inner valley gorges, and excessively wet slopes such as those near springs. In addition, avoid areas where large cuts and fills would be required.
    - Locate roads to minimize roadway drainage areas and to avoid modifying the natural drainage areas of small streams.
9. Project developments should be designed, and located to avoid direct or indirect loss or modification of Mexican spotted owl nesting and/or identified roosting habitats. 10. Water production associated with BLM authorized actions should be managed to ensure maintenance or enhancement of riparian habitats.

Southwestern willow flycatcher (*Empidonax traillii extimus*)

The following list of measures provides species-specific guidance intended to avoid, minimize, or reduce potential adverse impacts from implementation of BLM actions on the Southwestern willow flycatcher (*Empidonax traillii extimus*). This list is not comprehensive. Additional conservation measures, or other modified versions of these measures, may be applied for any given BLM-authorized activity upon further analysis, review, coordination efforts, and/or appropriate levels of section 7 consultation with the USFWS.

1. Surveys will be required prior to operations that —may adversely affect the Southwestern willow flycatcher unless species occupancy data and distribution information is complete and available. Surveys will only be conducted by BLM-approved personnel. In the event species occurrence is verified, project proponents may be required to modify operational plans at the discretion of the authorized officer. Modifications may include appropriate measures for minimization of adverse effects to the Southwestern willow flycatcher and its habitat.
2. BLM will monitor and restrict, when and where necessary, authorized or casual use activities that —may adversely affect the Southwestern willow flycatcher, including but not limited to, recreation, mining, and oil and gas activities. Monitoring results should be considered in the design and implementation of future projects.

3. To monitor the impacts of BLM-authorized projects determined —likely to adversely affect the Southwestern willow flycatcher, BLM should prepare a short report describing progress, including success of implementation of all associated mitigation. Reports shall be submitted annually to the USFWS Utah Field Office by March 1st beginning one full year from date of implementation of the proposed action. The report shall list and describe the following items:

    a. Any unforeseen adverse effects resulting from activities of each site-specific project (may also require reinitiation of formal Consultation);

    b. When, and if, any level of anticipated incidental take is approached (as allowed by separate Incidental Take Statements of site-specific Formal Section 7 Consultation efforts);

    c. When, or if, the level of anticipated take (as allowed by separate Incidental Take Statements from site-specific formal consultations) is exceeded; and

    d. Results of annual, periodic monitoring which evaluate the effectiveness of the reasonable and prudent measures or terms and conditions of the site-specific Consultation.

4. BLM should avoid granting activity permits or authorizing development actions in Southwestern willow flycatcher habitat. Unoccupied potential habitat should be protected in order to preserve them for future management actions associated with the recovery of the Southwestern willow flycatcher.

5. BLM will ensure project design incorporates measures to avoid direct disturbance to populations and suitable habitats where possible. At a minimum, project designs should include consideration of water flows, slope, seasonal and spatial buffers, possible fencing, and pre-activity flagging of critical areas for avoidance.

6. The BLM will continue to address illegal and unauthorized OHV use and activity upon BLM administered lands. In order to protect, conserve, and recover the Southwestern willow flycatcher in areas of heavy unauthorized use, temporary closures, or use restrictions beyond those which are already in place, may be imposed. As funding allows, BLM should complete a comprehensive assessment of all OHV use areas that interface with Southwestern willow flycatcher populations. Comparison of Southwestern willow flycatcher populations and OHV use areas using GIS would give BLM personnel another tool to manage and/or minimize impacts.

7. All surface disturbing activities should be restricted within a 0.25 mile buffer from suitable riparian habitats and permanent surface disturbances should be avoided within 0.5 mile of suitable Southwestern willow flycatcher habitat.

    - Unavoidable ground disturbing activities in occupied Southwestern willow flycatcher habitat should only be conducted when preceded by current year survey, should only occur between August 16 and April 30 (the period when Southwestern willow flycatcher are not likely to be breeding), and should be monitored to ensure that adverse impacts to Southwestern willow flycatcher are minimized or avoided, and to document the success of project specific

mitigation/protection measures. As monitoring is relatively undefined, project specific requirements must be identified.

8. BLM will properly consider nesting periods for Southwestern willow flycatcher when conducting horse gathering operations in the vicinity of habitat.
9. BLM will ensure that plans for water extraction and disposal are designed to avoid changes in the hydrologic regime that would likely result in loss or undue degradation of riparian habitat.
10. Native species will be preferred over non-native for revegetation of habitat in disturbed areas.
11. BLM will coordinate with other agencies and private landowners to identify voluntary opportunities to modify current land stewardship practices that may impact the Southwestern willow flycatcher and its habitats.
12. Limit disturbances to within suitable habitat by staying on designated routes.
13. Ground-disturbing activities will require monitoring throughout the duration of the project to ensure that adverse impacts to Southwestern willow flycatcher are avoided. Monitoring results should document what, if any, impacts to individuals or habitat occur during project construction/implementation. In addition, monitoring should document successes or failures of any impact minimization or mitigation measures. Monitoring results would be considered an opportunity for adaptive management and, as such, would be carried forward in the design and implementation of future projects.
14. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in Southwestern willow flycatcher habitat.
15. Habitat disturbances (i.e., organized recreational activities requiring special use permits, drilling activities, etc.) will be avoided within 0.25 mile of suitable Southwestern willow flycatcher habitat from May 1 to August 15.
16. Grazing allotments that contain habitat for the species will be managed with consideration for recommendations provided by the Southwestern willow flycatcher Recovery Plan, and other applicable research.

Uinta Basin hookless cactus (*Sclerocactus glaucus* [= *S. brevispinus* and *S. wetlandicus*])

The following list of measures provides species-specific guidance intended to avoid, minimize, or reduce potential adverse impacts from implementation of BLM actions on the Uinta Basin hookless cactus (*Sclerocactus glaucus*). This list is not comprehensive. Additional conservation measures, or other modified versions of these measures, may be applied for any given BLM-authorized activity upon further analysis, review, coordination efforts, and/or appropriate levels of section 7 consultation with the USFWS.

1. Prior to surface disturbing activities in habitat for the species, presence/absence surveys of potentially affected areas will be conducted in accordance with established protocols.
2. Appropriate avoidance/protection/mitigation will be used to manage potential impacts of similar subsequent projects. These measures should include, but are not be limited to:

a. the stabilization of soils to minimize or avoid impacts related to soil erosion;

b. marking/flagging of suitable and/or occupied habitat (including predetermined buffers) prior to development to avoid trampling by crew members or equipment during disturbance related activities; and

c. require project proponents to conduct surveys and monitoring actions using BLM-approved specialists to document population effects and individual impacts.

3. BLM shall continue to document new populations of Uinta Basin hookless cactus as they are encountered.
4. To assist and support recovery efforts, BLM will minimize or avoid surface disturbances in habitats that support the species.
5. BLM will encourage and assist project proponents in development and design of their proposed actions in order to avoid direct disturbance to suitable habitat, populations, or individuals where feasible. Designs should consider water flow, slope, appropriate buffer distances, possible fencing needs, and pre-activity flagging of sensitive areas that are planned for avoidance.
6. BLM will consider emergency OHV closure or additional restrictions to protect, conserve, and recover the species.
7. In areas where dispersed recreational uses are identified as threats to populations of the species, BLM will consider the development of new recreational facilities/opportunities that concentrate dispersed recreational use away from habitat, especially occupied habitat.
8. Cultural and paleontological survey/recovery technicians (i.e., archeologists and/or paleontologists), conducting work in the vicinity of known populations, will be educated in the identification of listed species in order to avoid inadvertent trampling or removal during survey, mapping, or excavation of cultural or paleontological resources.
9. Areas of viable habitat, in the vicinity of populations considered for prescribed burning, will be surveyed according to established protocols for new or undocumented populations of the species.
10. Lands being considered for exchange or disposal that contain suitable habitat for the species will be surveyed for undocumented populations, according to established protocols, prior to approval of such disposal. Lands supporting populations shall not be disposed of unless it is determined that the action will not threaten the survival and recovery of the species in accordance with the ESA and BLM Guidance and Policy Manual 6840 – Special Status Species Management.
11. BLM will encourage the avoidance of key habitats during livestock herding and trailing activities on BLM administered lands. (Key habitats are those that are deemed necessary for the conservation of the species including, but not necessarily limited to, designated critical habitat and other occupied or unoccupied habitats considered important for the species survival and recovery as determined in coordination with the USFWS).

San Rafael and Winkler cactus (*Pediocactus spp.*)

The following list of measures provides species-specific guidance intended to avoid, minimize, or reduce potential adverse impacts from implementation of BLM actions on the San Rafael (*Pediocactus despainii*) and Winkler cactus (*Pediocactus winkleri*). This list is not comprehensive. Additional conservation measures, or other modified versions of these measures, may be applied for any given BLM-authorized activity upon further analysis, review, coordination efforts, and/or appropriate levels of section 7 consultation with the USFWS.

1. Prior to surface disturbing activities in habitat for the species, presence/absence surveys of potentially affected areas will be conducted in accordance with established protocols.
2. Appropriate avoidance/protection/mitigation will be used to manage potential impacts of similar subsequent projects. These measures should include, but are not be limited to:
    a. the stabilization of soils to minimize or avoid impacts related to soil erosion;
    b. marking/flagging of suitable and/or occupied habitat (including predetermined buffers) prior to development to avoid trampling by crew members or equipment during disturbance related activities; and
    c. require project proponents to conduct surveys and monitoring actions using BLM-approved specialists to document population effects and individual impacts.
3. BLM shall continue to document new populations of San Rafael and Winkler cacti as they are encountered.
4. To assist and support recovery efforts, BLM will minimize or avoid surface disturbances in habitats that support the species.
5. BLM will encourage and assist project proponents in development and design of their proposed actions in order to avoid direct disturbance to populations or individuals where feasible. Designs should consider water flow, slope, appropriate buffer distances, possible fencing needs, and pre-activity flagging of sensitive areas that are planned for avoidance.
6. BLM will consider emergency OHV closure or additional restrictions to protect, conserve, and recover the species.
7. In areas where dispersed recreational uses are identified as threats to populations of the species, BLM will consider the development of new recreational facilities/opportunities that concentrate dispersed recreational use away from habitat, especially occupied habitat.
8. Cultural and paleontological survey/recovery technicians (i.e., archeologists and/or paleontologists), conducting work in the vicinity of known populations, will be educated in the identification of listed species in order to avoid inadvertent trampling or removal during survey, mapping, or excavation of cultural or paleontological resources.
9. Areas of viable habitat, in the vicinity of populations considered for prescribed burning, will be surveyed according to established protocols for new or undocumented populations of the species.
10. Lands being considered for exchange or disposal that contain suitable habitat for the species will be surveyed for undocumented populations, according to established

protocols, prior to approval of such disposal. Lands supporting populations shall not be disposed of unless it is determined that the action will not threaten the survival and recovery of the species in accordance with the ESA and BLM Guidance and Policy Manual 6840 – Special Status Species Management.

11. BLM will encourage the avoidance of key habitats during livestock herding and trailing activities on BLM administered lands. (Key habitats are those that are deemed necessary for the conservation of the species including, but not necessarily limited to, designated critical habitat and other occupied or unoccupied habitats considered important for the species survival and recovery as determined in coordination with the USFWS).
12. As additional funding becomes available, BLM should develop a travel management plan specifically for areas of occupied and potential habitat for San Rafael and Winkler cactus.
13. As additional funding becomes available, BLM will conduct or encourage monitoring studies in areas to which topsoil has been placed with the intention of transferring the seed bank from San Rafael and Winkler cactus populations, to mitigate population losses from development activities. The purpose of these studies would be to evaluate mitigation measures for effectiveness in reestablishing populations of the species.

Wright fishhook cactus (*Sclerocactus wrightiae*)

The following list of measures provides species-specific guidance intended to avoid, minimize, or reduce potential adverse impacts from implementation of BLM actions under the authority of current Utah BLM LUPs on the Wright fishhook cactus. This list is not comprehensive. Additional conservation measures, or other modified versions of these measures, may be applied for any given BLM-authorized activity upon further analysis, review, coordination efforts, and/or appropriate levels of section 7 consultation with the USFWS.

1. Prior to surface disturbing activities in habitat for the species, presence/absence surveys of potentially affected areas will be conducted in accordance with established protocols.
2. Appropriate avoidance/protection/mitigation will be used to manage potential impacts of similar subsequent projects. These measures should include, but are not be limited to:
    a. the stabilization of soils to minimize or avoid impacts related to soil erosion;
    b. marking/flagging of suitable and/or occupied habitat (including predetermined buffers) prior to development to avoid trampling by crew members or equipment during disturbance related activities; and
    c. require project proponents to conduct surveys and monitoring actions using BLM-approved specialists to document population effects and individual impacts.
3. BLM shall continue to document new populations of Wright fishhook cactus as they are encountered.
4. To assist and support recovery efforts, BLM will minimize or avoid surface disturbances in habitats that support the species.
5. BLM will encourage and assist project proponents in development and design of their proposed actions in order to avoid direct disturbance to populations or individuals where

feasible. Designs should consider water flow, slope, appropriate buffer distances, possible fencing needs, and pre-activity flagging of sensitive areas that are planned for avoidance.

6. BLM will consider emergency OHV closure or additional restrictions to protect, conserve, and recover the species.
7. In areas where dispersed recreational uses are identified as threats to populations of the species, BLM will consider the development of new recreational facilities/opportunities that concentrate dispersed recreational use away from habitat, especially occupied habitat.
8. Cultural and paleontological survey/recovery technicians (i.e., archeologists and/or paleontologists), conducting work in the vicinity of known populations, will be educated in the identification of listed species in order to avoid inadvertent trampling or removal during survey, mapping, or excavation of cultural or paleontological resources.
9. Areas of viable habitat, in the vicinity of populations considered for prescribed burning, will be surveyed according to established protocols for new or undocumented populations of the species.
10. Lands being considered for exchange or disposal that contain suitable habitat for the species will be surveyed for undocumented populations, according to established protocols, prior to approval of such disposal. Lands supporting populations shall not be disposed of unless it is determined that the action will not threaten the survival and recovery of the species in accordance with the ESA and BLM Guidance and Policy Manual 6840 – Special Status Species Management.
11. BLM will encourage the avoidance of key habitats during livestock herding and trailing activities on BLM administered lands. (Key habitats are those that are deemed necessary for the conservation of the species including, but not necessarily limited to, designated critical habitat and other occupied or unoccupied habitats considered important for the species survival and recovery as determined in coordination with the USFWS).
12. As funding permits, BLM will consider research opportunities to determine whether the mortality to recruitment ratio of 2.5 to 1, observed by Kass (2001) persists within studied populations. These observed ratios have resulted in the decline and ultimate loss of some populations. Therefore, future research might study how widespread the decline may be. To accomplish this, several populations should be selected that represent a range of habitats, locations, proximity to potential threats and relative population sizes. Populations should be monitored for changes in number and overall condition to determine whether these observed mortality rates are characteristic of the species throughout its range.

Maguire Daisy (*Erigeron maguirei*)

The following list of measures provides species-specific guidance intended to avoid, minimize, or reduce potential adverse impacts from implementation of BLM actions on the Maguire daisy (*Erigeron maguirei*). This list is not comprehensive. Additional conservation measures, or other modified versions of these measures, may be applied for any given BLM-authorized activity upon further analysis, review, coordination efforts, and/or appropriate levels of section 7 consultation with the USFWS.

1. Prior to surface disturbing activities in habitat for the species, presence/absence surveys of potentially affected areas will be conducted in accordance with established protocols.
2. Appropriate avoidance/protection/mitigation will be used to manage potential impacts of similar subsequent projects. These measures should include, but are not be limited to:
    a. the stabilization of soils to minimize or avoid impacts related to soil erosion;
    b. marking/flagging of suitable and/or occupied habitat (including predetermined buffers) prior to development to avoid trampling by crew members or equipment during disturbance related activities; and
    c. require project proponents to conduct surveys and monitoring actions using BLM-approved specialists to document population effects and individual impacts.
3. BLM shall continue to document new populations of Maguire daisy (*Erigeron maguirei*) as they are encountered.
4. To assist and support recovery efforts, BLM will minimize or avoid surface disturbances in habitats that support the species.
5. BLM will encourage and assist project proponents in development and design of their proposed actions in order to avoid direct disturbance to populations or individuals where feasible. Designs should consider water flow, slope, appropriate buffer distances, possible fencing needs, and pre-activity flagging of sensitive areas that are planned for avoidance.
6. BLM will consider emergency OHV closure or additional restrictions to protect, conserve, and recover the species.
7. In areas where dispersed recreational uses are identified as threats to populations of the species, BLM will consider the development of new recreational facilities/opportunities that concentrate dispersed recreational use away from habitat, especially occupied habitat.
8. Cultural and paleontological survey/recovery technicians (i.e., archeologists and/or paleontologists), conducting work in the vicinity of known populations, will be educated in the identification of listed species in order to avoid inadvertent trampling or removal during survey, mapping, or excavation of cultural or paleontological resources.
9. Areas of viable habitat, in the vicinity of populations considered for prescribed burning, will be surveyed according to established protocols for new or undocumented populations of the species.
10. Lands being considered for exchange or disposal that contain suitable habitat for the species will be surveyed for undocumented populations, according to established protocols, prior to approval of such disposal. Lands supporting populations shall not be disposed of unless it is determined that the action will not threaten the survival and recovery of the species in accordance with the ESA and BLM Guidance and Policy Manual 6840 – Special Status Species Management.
11. BLM will encourage the avoidance of key habitats during livestock herding and trailing activities on BLM administered lands. (Key habitats are those that are deemed necessary for the conservation of the species including, but not necessarily limited to, designated

critical habitat and other occupied or unoccupied habitats considered important for the species survival and recovery as determined in coordination with the USFWS).

Jones cycladenia (*Cycladenia humilis* var. *jonesii*)

The following list of measures provides species-specific guidance intended to avoid, minimize, or reduce potential adverse impacts from implementation of BLM actions on the Jones cycladenia (*Cycladenia humilis* var. *jonesii*). This list is not comprehensive. Additional conservation measures, or other modified versions of these measures, may be applied for any given BLM-authorized activity upon further analysis, review, coordination efforts, and/or appropriate levels of section 7 consultation with the USFWS.

1. Prior to surface disturbing activities in habitat for the species, presence/absence surveys of potentially affected areas will be conducted in accordance with established protocols.
2. Appropriate avoidance/protection/mitigation will be used to manage potential impacts of similar subsequent projects. These measures should include, but are not be limited to:
    a. the stabilization of soils to minimize or avoid impacts related to soil erosion;
    b. marking/flagging of suitable and/or occupied habitat (including predetermined buffers) prior to development to avoid trampling by crew members or equipment during disturbance related activities; and
    c. require project proponents to conduct surveys and monitoring actions using BLM-approved specialists to document population effects and individual impacts.
3. BLM shall continue to document new populations of Jones cycladenia (*Cycladenia humilis* var. *jonesii*) as they are encountered.
4. To assist and support recovery efforts, BLM will minimize or avoid surface disturbances in habitats that support the species.
5. BLM will encourage and assist project proponents in development and design of their proposed actions in order to avoid direct disturbance to populations or individuals where feasible. Designs should consider water flow, slope, appropriate buffer distances, possible fencing needs, and pre-activity flagging of sensitive areas that are planned for avoidance.
6. BLM will consider emergency OHV closure or additional restrictions to protect, conserve, and recover the species.
7. In areas where dispersed recreational uses are identified as threats to populations of the species, BLM will consider the development of new recreational facilities/opportunities that concentrate dispersed recreational use away from habitat, especially occupied habitat.
8. Cultural and paleontological survey/recovery technicians (i.e., archeologists and/or paleontologists), conducting work in the vicinity of known populations, will be educated in the identification of listed species in order to avoid inadvertent trampling or removal during survey, mapping, or excavation of cultural or paleontological resources.
9. Areas of viable habitat, in the vicinity of populations considered for prescribed burning, will be surveyed according to established protocols for new or undocumented populations of the species.

10. Lands being considered for exchange or disposal that contain suitable habitat for the species will be surveyed for undocumented populations, according to established protocols, prior to approval of such disposal. Lands supporting populations shall not be disposed of unless it is determined that the action will not threaten the survival and recovery of the species in accordance with the ESA and BLM Guidance and Policy Manual 6840 – Special Status Species Management.
11. BLM will encourage the avoidance of key habitats during livestock herding and trailing activities on BLM administered lands. (Key habitats are those that are deemed necessary for the conservation of the species including, but not necessarily limited to, designated critical habitat and other occupied or unoccupied habitats considered important for the species survival and recovery as determined in coordination with the USFWS).

Last Chance townsendia (*Townsendia aprica*)

The following list of measures provides species-specific guidance intended to avoid, minimize, or reduce potential adverse impacts from implementation of BLM actions on the Last Chance townsendia (*Townsendia aprica*). This list is not comprehensive. Additional conservation measures, or other modified versions of these measures, may be applied for any given BLM-authorized activity upon further analysis, review, coordination efforts, and/or appropriate levels of section 7 consultation with the USFWS.

1. Prior to surface disturbing activities in habitat for the species, presence/absence surveys of potentially affected areas will be conducted in accordance with established protocols.
2. Appropriate avoidance/protection/mitigation will be used to manage potential impacts of similar subsequent projects. These measures should include, but are not be limited to:
    a. the stabilization of soils to minimize or avoid impacts related to soil erosion;
    b. marking/flagging of suitable and/or occupied habitat (including predetermined buffers) prior to development to avoid trampling by crew members or equipment during disturbance related activities;
    c. require project proponents to conduct surveys and monitoring actions using BLM-approved specialists to document population effects and individual impacts.
3. BLM shall continue to document new populations of Last Chance townsendia (*Townsendia aprica*) as they are encountered.
4. To assist and support recovery efforts, BLM will minimize or avoid surface disturbances in habitats that support the species.
5. BLM will encourage and assist project proponents in development and design of their proposed actions in order to avoid direct disturbance to populations or individuals where feasible. Designs should consider water flow, slope, appropriate buffer distances, possible fencing needs, and pre-activity flagging of sensitive areas that are planned for avoidance.
6. BLM will consider emergency OHV closure or additional restrictions to protect, conserve, and recover the species.
7. In areas where dispersed recreational uses are identified as threats to populations of the species, BLM will consider the development of new recreational facilities/opportunities

that concentrate dispersed recreational use away from habitat, especially occupied habitat.

8. Cultural and paleontological survey/recovery technicians (i.e., archeologists and/or paleontologists), conducting work in the vicinity of known populations, will be educated in the identification of listed species in order to avoid inadvertent trampling or removal during survey, mapping, or excavation of cultural or paleontological resources.
9. Areas of viable habitat, in the vicinity of populations considered for prescribed burning, will be surveyed according to established protocols for new or undocumented populations of the species.
10. Lands being considered for exchange or disposal that contain suitable habitat for the species will be surveyed for undocumented populations, according to established protocols, prior to approval of such disposal. Lands supporting populations shall not be disposed of unless it is determined that the action will not threaten the survival and recovery of the species in accordance with the ESA and BLM Guidance and Policy Manual 6840 – Special Status Species Management.
11. BLM will encourage the avoidance of key habitats during livestock herding and trailing activities on BLM administered lands. (Key habitats are those that are deemed necessary for the conservation of the species including, but not necessarily limited to, designated critical habitat and other occupied or unoccupied habitats considered important for the species survival and recovery as determined in coordination with the USFWS).

Barneby Reed-Mustard (*Schoenocrambe barnebyi*)

The following list of measures provides species-specific guidance intended to avoid, minimize, or reduce potential adverse impacts from implementation of BLM actions on the Utah reed-mustards. This list is not comprehensive. Additional conservation measures, or other modified versions of these measures, may be applied for any given BLM-authorized activity upon further analysis, review, coordination efforts, and/or appropriate levels of section 7 consultation with the USFWS.

1. Prior to surface disturbing activities in habitat for the species, presence/absence surveys of potentially affected areas will be conducted in accordance with established protocols.
2. Appropriate avoidance/protection/mitigation will be used to manage potential impacts of similar subsequent projects. These measures should include, but are not be limited to:
    a. the stabilization of soils to minimize or avoid impacts related to soil erosion;
    b. marking/flagging of suitable and/or occupied habitat (including predetermined buffers) prior to development to avoid trampling by crew members or equipment during disturbance related activities; and
    c. require project proponents to conduct surveys and monitoring actions using BLM-approved specialists to document population effects and individual impacts.
3. BLM shall continue to document new populations of each species as they are encountered.

4. To assist and support recovery efforts, BLM will minimize or avoid surface disturbances in habitats that support the species.
5. BLM will encourage and assist project proponents in development and design of their proposed actions in order to avoid direct disturbance to suitable habitat, populations or individuals where feasible. Designs should consider water flow, slope, appropriate buffer distances, possible fencing needs, and pre-activity flagging of sensitive areas that are planned for avoidance.
6. BLM will consider emergency OHV closure or additional restrictions to protect, conserve, and recover the species.
7. In areas where dispersed recreational uses are identified as threats to populations of the species, BLM will consider the development of new recreational facilities/opportunities that concentrate dispersed recreational use away from habitat, especially occupied habitat.
8. Cultural and paleontological survey/recovery technicians (i.e., archeologists and/or paleontologists), conducting work in the vicinity of known populations, will be educated in the identification of listed species in order to avoid inadvertent trampling or removal during survey, mapping, or excavation of cultural or paleontological resources.
9. Areas of viable habitat, in the vicinity of populations considered for prescribed burning, will be surveyed according to established protocols for new or undocumented populations of the species.
10. Lands being considered for exchange or disposal that contain suitable habitat for the species will be surveyed for undocumented populations, according to established protocols, prior to approval of such disposal. Lands supporting populations shall not be disposed of unless it is determined that the action will not threaten the survival and recovery of the species in accordance with the ESA and BLM Guidance and Policy Manual 6840 – Special Status Species Management.
11. BLM will encourage the avoidance of key habitats during livestock herding and trailing activities on BLM administered lands. (Key habitats are those that are deemed necessary for the conservation of the species including, but not necessarily limited to, designated critical habitat and other occupied or unoccupied habitats considered important for the species survival and recovery as determined in coordination with the USFWS).

Colorado River Endangered Fish Bonytail (*Gila elegans*), Colorado Pikeminnow (*Ptychocheilus lucius*), Humpback Chub (*Gila cypha*), and Razorback Sucker (*Xyrauchen texanus*)

The following list of measures provides species-specific guidance intended to avoid, minimize, or reduce potential adverse impacts from implementation of BLM actions on the Colorado pikeminnow, Humpback chub, bonytail, and razorback sucker, herein referred to as the Colorado River fishes. This list is not comprehensive. Additional conservation measures, or other modified versions of these measures, may be applied for any given BLM-authorized activity upon further analysis, review, coordination efforts, and/or appropriate levels of section 7 consultation with the USFWS.

1. Monitoring of impacts of site-specific projects authorized by the BLM will result in the preparation of a report describing the progress of each site-specific project, including implementation of any associated reasonable and prudent measures or reasonable and prudent alternatives. This will be a requirement of project proponents and will be included as a condition of approval (COA) on future proposed actions that have been determined to have the potential for take. Reports will be submitted annually to the USFWS - Utah Field Office, beginning after the first full year of implementation of the project, and shall list and describe:
    a. Any unforeseen direct or indirect adverse impacts that result from activities of each site-specific project;
    b. Estimated levels of impact or water depletion, in relation to those described in the original project-level Consultation effort, in order to inform the Service of any intentions to reinitiate Section 7 Consultation; and
    c. Results of annual, periodic monitoring which evaluates the effectiveness of any site-specific terms and conditions that are part of the formal Consultation process. This will include items such as an assessment of whether implementation of each site-specific project is consistent with that described in the BA, and whether the project has complied with terms and conditions.
2. The BLM shall notify the USFWS immediately of any unforeseen impacts detected during project implementation. Any implementation action that may be contributing to the introduction of toxic materials or other causes of fish mortality must be immediately stopped until the situation is remedied. If investigative monitoring efforts demonstrate that the source of fish mortality is not related to the authorized activity, the action may proceed only after notification of USFWS authorities.
3. Unoccupied, suitable habitat areas should be protected in order to preserve them for future management actions associated with the recovery of the Endangered Colorado River Fish, as well as approved reintroduction, or relocation efforts.
    - BLM will avoid impacts where feasible, to habitats considered most representative of prime suitable habitat for these species.
    - Surface disturbing activities will be restricted within ¼ mile of the channel centerline of the Green, Price, and San Rafael Rivers
    - Surface disturbing activities proposed to occur within floodplains or riparian areas will be avoided unless there is no practical alternative or the development would enhance riparian/aquatic values. If activities must occur in these areas, construction will be designed to include mitigation efforts to maintain, restore, and/or improve riparian and aquatic conditions. If conditions could not be maintained, offsite mitigation strategies should be considered.
4. BLM will ensure project proponents are aware that designs must avoid as much direct disturbance to current populations and known habitats as is feasible. Designs should include:
    a. protections against toxic spills into rivers and floodplains;

b. plans for sedimentation reduction;

c. minimization of riparian vegetation loss or degradation;

d. pre-activity flagging of critical areas for avoidance;

e. design of stream-crossings for adequate passage of fish; and

f. measures to avoid or minimize impacts on water quality at the 25-year frequency runoff

5. Prior to surface disturbing activities, specific principles will be considered to control erosion. These principles include:

   - Conduct long-range transportation and access planning for large areas to ensure that roads will serve future needs. This will result in less total surface disturbance.
   - Avoid, where possible, surface disturbance in areas with high erosion hazards.
   - Avoid mid-slope location of drill pads, headwalls at the source of tributary drainages, inner valley gorges, excessively wet slopes such as those near springs and avoid areas where large cuts and fills would be required.
   - Design and locate roads to minimize roadway drainage areas and to avoid modifying the natural drainage areas of small streams.

6. Where technically and economically feasible, project proponents will use directional drilling or multiple wells from a single pad to reduce surface disturbance and eliminate drilling in suitable riparian habitat. Ensure that such drilling does not intercept or degrade alluvial aquifers. Drilling will not occur within 100 year floodplains that contain listed fish species or their designated critical habitats.

7. The Utah Oil and Gas Pipeline Crossing Guidance (BLM National Science and Technology Center), or other applicable guidance, will be implemented for oil and gas pipeline river/stream crossings.

8. In areas adjacent to 100-year floodplains, particularly in systems prone to flash floods, BLM will analyze the risk for flash floods to impact facilities. Potential techniques may include the use of closed loop drilling and pipeline burial or suspension as necessary to minimize the potential for equipment damage and resultant leaks or spills.

9. Water depletions from any portion of the Upper Colorado River drainage basin above Lake Powell are considered to adversely affect and adversely modify the critical habitat of these endangered fish species. Section 7 consultation will be completed with the Service prior to any such water depletions.

10. Design stream-crossings for adequate passage of fish (if present), minimum impact on water quality, and at a minimum, a 25-year frequency run-off.

Additional Resource Protection Measures

Surface disturbing activities

- Evaluate areas subject to surface disturbance for the presence of cultural resources or values. This is usually accomplished through the completion of a cultural clearance. An

on-the-ground inspection by a qualified archaeologist, historian, or paleontologist is required. In cases where cultural resources are found, the preferred response would be to modify the proposed action to avoid the cultural resource (avoidance). If avoidance is not possible, actions would be taken to preserve the data or value represented by the cultural resource (mitigation).

- Evaluate areas subject to surface disturbance for the presence of threatened, endangered, or candidate animal or plant species. This is usually accomplished through the completion of a biological clearance. An on-the-ground inspection by a qualified biologist is required. In cases where threatened, endangered, or candidate species are affected, the preferred response would be to modify the proposed action to avoid species or their habitat (avoidance). If avoidance of a threatened, endangered, or candidate species or its habitat is not possible, a Section 7 consultation with USFWS would be required, and a biological assessment would be prepared to recommend actions to protect the species or its habitat.
- Consider requiring special design and reclamation measures to protect scenic and natural landscape values. These may include transplanting trees and shrubs, mulching and fertilizing disturbed areas, use of low-profile permanent facilities, and painting to minimize visual contrasts. Surface disturbing activities may be moved to avoid sensitive areas or to reduce the visual effects of the proposal.
- Design above-ground facilities requiring painting to blend in with the surrounding environment.
- Implement reclamation concurrent with construction and site operations to the extent possible. Final reclamation actions shall be initiated within 6 months of the termination of operations unless otherwise approved in writing by the authorized officer.
- Ensure fill material is pushed into cut areas and up over back slopes. Depressions should not be left that would trap water or form ponds.

Road Design and Maintenance

- Keep access roads to a minimum and use to only when necessary.
- Design roads to minimize total disturbance, conform with topography, and minimize disruption of natural drainage patterns.
- Locate roads on stable terrain, such as ridgetops; natural benches; and flatter transitional slopes near ridges, valley bottoms, and moderate sideslopes, and away from slumps, slide-prone areas, concave slopes, clay beds, and where rock layers dip parallel to the slope. Locate roads on well-drained soil types; avoid wet areas.
- Construct roads for surface drainage by using outslopes, crowns, grade changes, drain dips, waterbars, and/or insloping to ditches as appropriate. Maintain drain dips, waterbars, road crown, insloping, and outsloping, as appropriate, during road maintenance. Grade roads only as necessary.
- Sloping the road base to the outside edge for surface drainage is normally recommended for local spurs or minor collector roads where low traffic volume and lower traffic speeds are anticipated. This is also recommended in situations where long intervals between maintenance will occur and where minimum excavation is wanted. Outsloping is not recommended on steep slopes. Sloping the road base to the inside edge is an acceptable

practice on roads with steep sideslopes and where the underlying soil formation is very rocky and not subject to appreciable erosion or failure.

- Crown and ditching is recommended for arterial and collector roads where traffic volume, speed, intensity, and user comfort are considerations. Recommended gradients range from 0 percent to 15 percent where crown and ditching may be applied, as long as adequate drainage away from the road surface and ditch lines is maintained.
- In soil types with a low sand component, construct roads when soils are dry and not frozen, if possible. When these types of soils or road surfaces become saturated to a depth of three inches, BLM-authorized activities should be limited or cease unless otherwise approved by the authorized officer.
- Retain vegetation between roads and streams to filter runoff caused by roads.
- Use culverts that pass, at a minimum, a 50-year storm event and/or have a minimum diameter of 13 inches for permanent stream crossings and a minimum diameter of 18 inches for road cross-drains.
- Strip and stockpile topsoil ahead of construction of new roads, if feasible.
- Reapply soil to cut and fill slopes prior to revegetation.
- Use existing roads whenever possible rather than constructing new road systems.

Noxious Weed Management

- To reduce the potential for the introduction of noxious weeds, clean off all equipment with pressure washing prior to operating on BLM lands. Removal of all dirt, grease, and plant parts that may carry noxious weed seeds or vegetative parts is required and may be accomplished with a pressure hose.
- Ensure all seed, hay, straw, mulch, or other vegetation material transported and used on public land weed free zones for site stability, rehabilitation, or project facilitation is free of noxious weeds and noxious weed seed as certified by a qualified federal, state, or county officer.

Road Design and Maintenance

- Keep access roads to a minimum and use to only when necessary.
- Design roads to minimize total disturbance, conform with topography, and minimize disruption of natural drainage patterns.
- Locate roads on stable terrain, such as ridgetops; natural benches; and flatter transitional slopes near ridges, valley bottoms, and moderate sideslopes, and away from slumps, slide-prone areas, concave slopes, clay beds, and where rock layers dip parallel to the slope. Locate roads on well-drained soil types; avoid wet areas.
- Construct roads for surface drainage by using outslopes, crowns, grade changes, drain dips, waterbars, and/or insloping to ditches as appropriate. Maintain drain dips, waterbars, road crown, insloping, and outsloping, as appropriate, during road maintenance. Grade roads only as necessary.
- Sloping the road base to the outside edge for surface drainage is normally recommended for local spurs or minor collector roads where low traffic volume and lower traffic speeds are anticipated. This is also recommended in situations where long intervals between maintenance will occur and where minimum excavation is wanted. Outsloping is not

recommended on steep slopes. Sloping the road base to the inside edge is an acceptable practice on roads with steep sideslopes and where the underlying soil formation is very rocky and not subject to appreciable erosion or failure.

- Crown and ditching is recommended for arterial and collector roads where traffic volume, speed, intensity, and user comfort are considerations. Recommended gradients range from 0 percent to 15 percent where crown and ditching may be applied, as long as adequate drainage away from the road surface and ditch lines is maintained.
- In soil types with a low sand component, construct roads when soils are dry and not frozen, if possible. When these types of soils or road surfaces become saturated to a depth of three inches, BLM-authorized activities should be limited or cease unless otherwise approved by the authorized officer.
- Retain vegetation between roads and streams to filter runoff caused by roads.
- Use culverts that pass, at a minimum, a 50-year storm event and/or have a minimum diameter of 13 inches for permanent stream crossings and a minimum diameter of 18 inches for road cross-drains.
- Strip and stockpile topsoil ahead of construction of new roads, if feasible.
- Reapply soil to cut and fill slopes prior to revegetation.
- Use existing roads whenever possible rather than constructing new road systems.

Right-of-Way and Utility Corridors

- Ensure rights-of-way (ROW) and utility corridors use areas adjoining or adjacent to previously disturbed areas whenever possible.
- Stabilize disturbed areas within road ROWs and utility corridors with vegetation practices designed to hold soil in place and minimize erosion. Reestablish vegetation cover to increase infiltration and provide additional protection from erosion.
- Construct sediment barriers when needed to slow runoff, allow deposition of sediment, and prevent transport from the site. Straining or filtration mechanisms may also be employed for the removal of sediment from runoff.

Visual Resource Management

- Use repetition of elements of form, line, color, and texture to blend facilities with the surrounding landscape.
- Paint all above-ground structures not requiring safety coloration an environmental color two shades darker than the surrounding environment.
- Reclaim and recontour all disturbed areas, including access roads, to the original contour or a contour that blends with the surrounding topography.
- Avoid facility placement on steep slopes, ridge tops, and hilltops.
- Reclaim unused well pads within 1 year.

Developed Recreation

- Construct recreation sites and provide appropriate sanitation facilities to minimize impacts to resource values, maximize public hazardous materials, and minimize user conflicts related to approved activities and access within an area as appropriate.

- Use public education and/or physical barriers (such as rocks, posts, and vegetation) to direct or preclude uses and to minimize impacts to resource values.

Riparian/Wetland Areas

- Avoid locating roads, trails, and landings in wetlands.
- Locate, identify, and mark riparian management areas during design of projects that may cause adverse impacts to riparian management areas.
- Keep open water free from slash.
- Avoid equipment operation in areas of open water, seeps, and springs.
- Use low ground pressure equipment (floatation tires or tracked) as necessary to minimize rutting and compaction.

Water Developments

- Actual work in springs and stream beds will be done by hand where possible. If machinery is needed in these areas, it will be selected to minimize disturbance.
- After construction of spring head boxes, troughs, pipelines, and well sites, the areas will be cleaned up and refuse removed.
- Cuts, fills, and excavations will be dressed and seeded to blend with surroundings. Pipelines will be buried where possible.
- Original water sources will be protected, fenced if required, and an off-stream watering supply will be provided near the site.
- Size of storage tanks and troughs will be designed to accommodate expected needs of livestock and wildlife using each water source.
- Water will be left at the site for wildlife. Wells will be cased to prevent cave-ins and well sites will be fenced.
- Storage structures will be designed to provide water for wildlife. Drinking ramps will be installed and heights will not prohibit young wildlife from obtaining water.

Critical habitat

- Currently, no designated critical habitat has been identified for the California condor, Utah prairie dog, Barneby reed-mustard, Last Chance townsendia, Jones cycladenia, Maguire daisy, Uinta Basin hookless cactus, San Rafael cactus, Winkler cactus, or Wright fishhook cactus within the Price planning area. If critical habitat is proposed and designated under section 4 of the ESA (CFR 50 402.02), these areas would be protected from future surface disturbing activities that would adversely modify or destroy the designated critical habitat. Currently critical habitat has only been designated for the Mexican spotted owl in the Desolation Canyon and surrounding area.

Fire and Fuels Management

- Areas considered for prescribed burns shall be surveyed for populations of threatened and endangered species and viable habitat.
- To reduce risks and to restore ecosystems, the following fuels management tools would be allowed throughout Utah: wildland fire use, prescribed fire, and mechanical, chemical,

and biological actions. As conditions allow, the BLM would employ the least intrusive method over more intrusive methods. For example, wildland fire use is the preferred method of treatment. Where wildland fire use is not feasible, prescribed burning would be the preferred method. Where prescribed burning is not feasible, non-fire fuel treatments would become the preferred method of treatment.

- Monitoring actions for special status species would be undertaken to determine results from fire management decisions and actions. Monitoring results would be used in determining the need for further LUP amendment or revisions.

Lands and Realty Management

- Areas considered for disposal that contain suitable habitat for special status species shall be surveyed for populations of the species prior to disposal. Lands should not be disposed of unless it is determined that the action would pose no threat to the conservation of special status species populations and habitat.
- Ensure rights-of-way (ROW) and utility corridors use areas adjoining or adjacent to previously disturbed areas whenever possible.
- Stabilize disturbed areas within road ROWs and utility corridors with vegetation practices designed to hold soil in place and minimize erosion. Reestablish vegetation cover to increase infiltration and provide additional protection from erosion.
- Construct sediment barriers when needed to slow runoff, allow deposition of sediment, and prevent transport from the site. Straining or filtration mechanisms may also be employed for the removal of sediment from runoff.

Livestock Grazing Management

- The Bureau of Land Management would encourage the avoidance of suitable habitats and known populations of all special status species during herding, trailing, salting, and watering of livestock.
- BLM should (will) establish monitoring programs for all federally listed plant populations to determine the long term impacts of grazing and other factors affecting those listed species.
- BLM should (will) establish monitoring programs for all federally listed plant populations to determine the long term impacts of grazing and other factors affecting those listed species.
- BLM will encourage the avoidance of key habitats during livestock herding and trailing activities on BLM administered lands. (Key habitats are those that are deemed necessary for the conservation of the species including, but not necessarily limited to, designated critical habitat and other occupied or unoccupied habitats considered important for the species survival and recovery as determined in coordination with FWS).
- BLM will conduct intensive surveys for target species regularly and within a 6 year period, i.e. no site is unvisited in over 6 years. Surveys will be on potential habitat within the grazing allotment and will collect information on the potential impact of livestock, recreational, or other uses on the long-term viability of rare plant species.
- Each grazing allotment containing listed species should have at least one monitoring plot per listed species to collect population demographic and trend data.

Cultural and Paleontological Resource Management

- Environmental assessments should continue to be required before excavation permits are issued. The environmental assessments should include the presence or absence of threatened, endangered, or special status species and their suitable habitats.

Vegetation Management

- Riparian habitats will be maintained, improved, or restored to provide wildlife habitat, improve water quality, and enhance forage conditions.
- When planting or seeding vegetation in areas identified as T&E or Special Status Species habitat, only native species would be selected.
- Water production will be managed to ensure maintenance or enhancement of riparian habitat.

Wild Horse and Burro Management

- BLM will avoid special status species populations and habitat during the construction of catchments facilities. BLM will also make an effort to avoid special status species populations and habitat during herding activities.

Wildlife Resource Management

- The BLM will continue to conduct project specific site inventories in areas that are proposed for all management developments that occur in suitable habitat for special status species

BEST MANAGEMENT PRACTICES

Best Management Practices (BMP's) are specific measures and practices which are considered at the project-specific level, on a case by case basis. BMP's should be implemented wherever possible, to reduce possible adverse affects, advance the protection, conservation, and recovery of special status species. Best Management practices will allow flexibility for resource managers to implement protective measures for special status species.

Cultural Resources and Paleontological Resources

- Archeologists can be educated and taught how to identify special status species in order to avoid trampling during excavations and fence construction efforts.

Energy and Mineral Development

- Surface restrictions should be placed in and around known populations of special status species.

Fire and Fuels Management

- Areas should also be analyzed when a wildfire determination is being made to either let it burn or suppress the fire.

Forestry and Woodlands Resource Management

- Individuals obtaining permits for posts, firewood, and Christmas trees would be directed to areas that do not contain known occupied habitat of special status species.

Lands and Realty Management

- Road construction, maintenance and right-of-way corridors shall be restricted in known populations of special status species.

Recreation

- OHV use should be designated as limited to existing roads and trails where known special status species populations exist.

Vegetation Resource Management

- The use of herbicides, chemical treatments and habitat manipulations should be restricted within special status species populations and habitat.
- Seeding and revegetation actions will be adjusted to the special habitat and plant community characteristics of endangered and threatened plant populations

Wild Horse and Burro Management

- The herding and trapping of wild horses and burros in special status species populations and habitat should be avoided to reduce additional trampling caused by such activities